ELECTRICAL REVIEW

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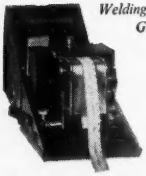
Some other instruments...

Battery Charge Indicator

Neutral Displacement Relay



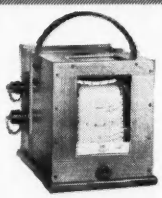
Welding Cycle Grapher

3-phase High Speed Maximum Reading Ammeter

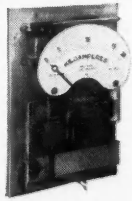
500kV Electrostatic Voltmeter

Marine Type Overload Relay

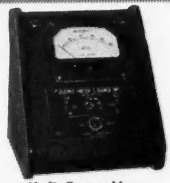
"Weathering Test" Cycle Controller



Railway Speed Grapher



Welding Current Peak Ammeter



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ELECTRICAL REVIEW 12th SEPTEMBER 1952

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872 • VOL. CLI • NO. 3903

Promoting Safety

IT is to the credit of our industry that, although accidents attributable to electricity form so minute a proportion of the total from all causes as to be grouped among " Miscellaneous " items, there is evident a general desire to reduce the number still further, despite the undesirable and too often sensational publicity this frankness may attract. This spirit is reflected in the reports on " Electrical Accidents " received each year from Mr. H. W. Swann, Senior Electrical Inspector of Factories. We have one adverse criticism to make of these reports and that is their continued tardy appearance. That for 1950 was issued only last week, though the constructive comments and advice on new as well as old works practice should surely have been made available before this.

Complacency would be wrong, but it is certainly gratifying that, despite a doubling of consumption of electricity in the past ten years, the number of reportable accidents has tended to diminish. Increased consumption of itself implies secondary hazards, including the introduction of new techniques, a wider use of portable tools, higher fuse or circuit breaker settings, involving greater risks of uncontrolled earth leakage, and difficulties in securing switchgear to cope with mounting fault kVA. Low resistance earth loops are sometimes not readily found, but transformation of mains voltage to 110 V (50 V to earth) is being increasingly adopted in damp situations, e.g., for building construction. Although 250 V may normally be regarded as safe with proper installations, it is significant that about 60 per cent of electrical fatalities occurred at lower voltages. Earthing still remains generally the basic safety need and while defective earth leads have resulted in accidents, these must be very few indeed compared with the unknown number they have prevented. Attention is drawn to the need for immediate application of artificial respiration after loss of consciousness from electric shock and to the desirability of occasional practice in correct methods. The statutory responsibility imposed on

occupiers of premises for the avoidance of accidents is a heavy one. The technical problems would be far beyond their ability to tackle but for the help they can expect to receive from the experienced engineers who are appointed as factory inspectors or retained by the Area Boards or on the works strength. Indeed the higher relative level of safety undoubtedly owes much to the improvement (noted in the report) in the status and authority of factory electrical engineers.

PRODUCTIVITY

Although the Anglo - American Council on Productivity has issued its final report (reviewed in this issue) its work will go on. The reports produced by the Council directly and on behalf of the industrial and specialist teams which have visited the United States stand as valuable sources of information and guidance to British industry. Additionally, the British Productivity Council which is being established will continue to keep before industrialists the importance of sustained effort to improve productive methods. The establishment of an American counterpart to this Productivity Council is being considered and visits of teams to the United States will still be possible under the ægis of the Mutual Security Agency which replaced the Economic Co-operation Administration (E.C.A.) at the end of last year.

WAGES POLICY

At the Trades Union Congress Margate meeting last week the Electrical Trades Union endeavoured unsuccessfully to get the Congress to discountenance the policy of wages restraint. Mr. Lincoln Evans described it as an attempt to institute a " free for all " scramble for higher wages in which the stronger unions, like the E.T.U. would succeed at the expense of the smaller ones. He pointed out that any increases were, in fact, paid for by the workers themselves in the shape of higher prices. The General Council's own statement on the subject was approved but this, while urging moderation, left the unions free to pursue their individual claims. The fact that approval of the statement was given not only by the Amalgamated Engineering Union, which has a £2 a week demand pending, but also by the E.T.U., suggests that it meant all things to all men.

ASH IN COAL

Ash is now recognized as more than a mere diluent of the heat value of coal. Apart from adding to transport and handling costs, it reduces boiler output and raises maintenance costs owing to fouling and corrosion of metal surfaces and it aggravates the grit nuisance. The proportion of ash in coal is tending to increase, but its baneful effects increase at a quicker rate, as is implied in the National Coal Board's price structure, more especially in regard to modern large boilers. The considerable knowledge existing of the varied aspects has not yet been fully collated and this lends special importance to the forthcoming conference of the Institute of Fuel, preliminary particulars of which are given in this issue.

THE RIDLEY REPORT

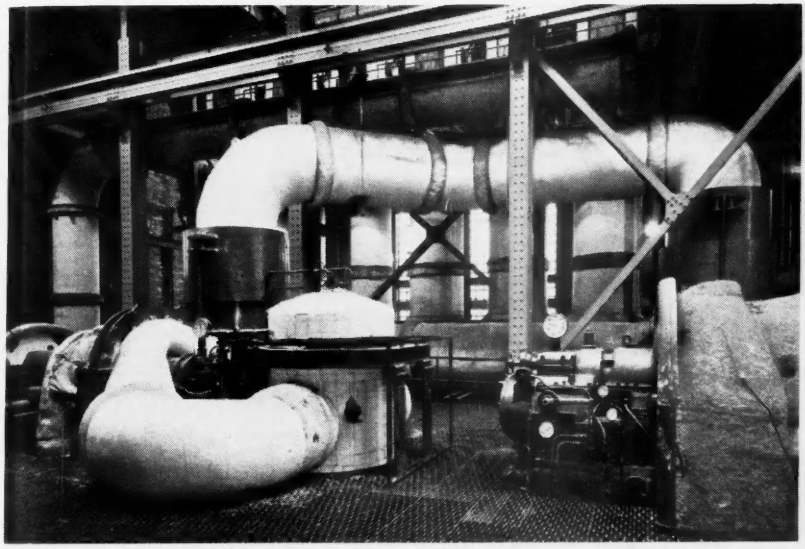
In this issue we review the report of the Committee on National Policy for the Use of Fuel and Power Resources, under the chairmanship of Viscount Ridley. We propose to reserve our comments on the report, which needs careful study, until next week.

ELECTRICAL WHO'S WHO

The second edition of this useful reference book contains brief biographies of over 4,000 men and women in all branches of the electrical industry and profession. Copies are obtainable at 12s 6d (postage 8d) from all booksellers or the Publishing Dept., Dorset House, Stamford Street, S.E.1.

First Gas Turbo-Alternator

M-V 15 MW SET AT TRAFFORD POWER STATION



Part view of the gas turbine with the h.p. end on left and the l.p. end on right. In the centre reheat combustion chamber and, above it, ducting taking preheated air to main combustion chamber. Heat exchangers can be seen at back

THE 6·6 kV gas turbo-generator which was put on load for the first time at the Trafford power station, Stretford, near Manchester, on 6th August,* was the first of its type to go into commission for the British Electricity Authority. The new plant was built by the Metropolitan-Vickers Electrical Co., Ltd., and is installed in an engine room adjoining that housing the steam plant at the station.

The plant, which operates on an open compound cycle, consists of a low-pressure compressor, an intercooler, a high-pressure compressor, a heat exchanger, a main combustion chamber, a high-pressure turbine, a reheat combustion chamber and a low-pressure turbine, through which the air or gas flows in the order named. The exhaust from the l.p. turbine passes back through the heat exchanger before it is discharged to the chimney stack.

The l.p. turbine is directly coupled to the l.p. compressor and to the 15 MW generator; it runs at a constant speed of 3,000 r.p.m. under the control of a speed governor regulating the fuel admission to both combustion chambers. The h.p. turbine and the h.p. compressor are coupled together and run at a speed determined by the load conditions (5,500 r.p.m. at full load).

The combined length of the two units is 80ft and, with an intervening space of 16ft occupied largely by the reheat chamber, the overall length is 96ft. The plant is designed for a gas inlet temperature to both turbines of approximately 1,200 deg F and an overall pressure ratio of 10 to 1. The plant is largely experimental; no doubt detail modifications will be made in the light of experience.

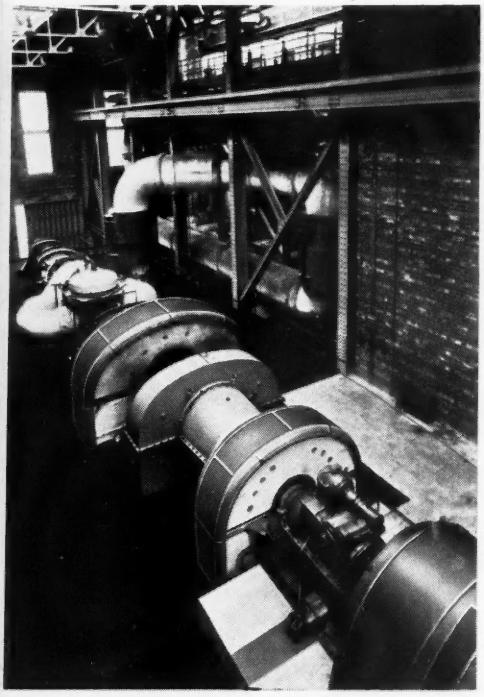
The incoming air is admitted to the l.p. compressor through a "Precipitron" electrostatic filter, 14·7 lb/sq in (abs.) and

Electrical Review, 15th August, 1952, p. 355.

15 deg C, which removes any solid impurities that might impair the efficiency of the compressor blading. The stack to which the exhaust gases pass on leaving the heat exchanger, 14·788 lb/sq in (abs.) and 234 deg C, is constructed of reinforced concrete and is 250ft high.

Gas oil is being used initially as the operating fuel, but later it is hoped to modify the plant to use heavier grade oils. On starting, the h.p. line is rotated by a 400 h.p. a.c. directly coupled starting motor and fuel is gradually admitted to the main combustion chamber; the motor is disengaged on reaching about 3,000 r.p.m. During this time the air drawn through the l.p. compressor and the gas discharge through the l.p. turbine slowly rotate the l.p. line, and as fuel is gradually admitted to the reheat chamber the speed of the l.p. line and the generator increases to 3,000 r.p.m. During idle periods the h.p. line runs at a speed of about 3,000 r.p.m.

Gas turbine from low-pressure end



Both compressors are similar in general construction, the l.p. machine having fourteen stages and the h.p. fifteen. The stators are of fabricated construction and the rotors are high tensile chrome-alloy forgings; the stainless steel blades are held in circumferential serrated grooves.

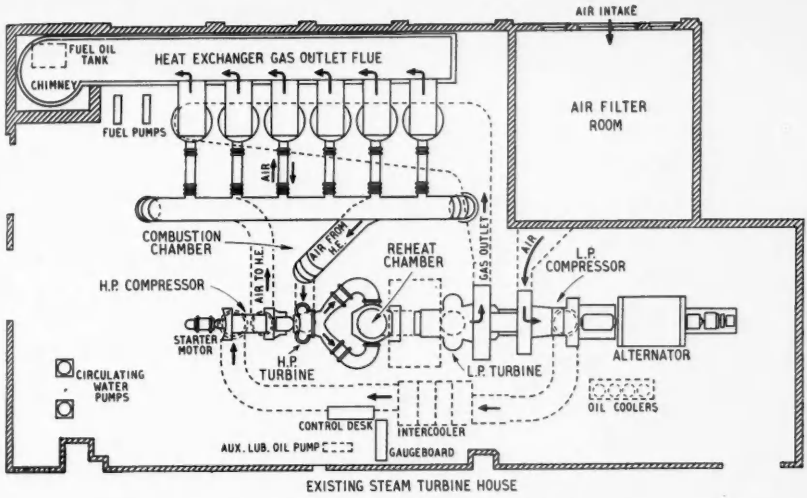
The h.p. turbine has two expansion stages. The stator and diaphragms are made of austenitic material and the nozzles of both stages of "Nimonic 75" alloy. The rotor is a molybdenum-vanadium forging having blades of "Nimonic 80A" held in axially serrated grooves.

The l.p. turbine has six stages and an austenitic stator, with diaphragms and nozzle blades for the first three stages of like material, while those for the last three stages are of ½ per cent molybdenum steel. The l.p. rotor body is a molybdenum-vanadium forging with axially serrated blade roots, holding blades of "Nimonic 80A" for the first row, of austenitic steel for stages two and three, and of ½ per cent molybdenum steel for the final three stages. The "Nimonic 75" and "Nimonic 80A" are alloys specially developed for high temperature duty and consist mainly of nickel and chromium.

Each compressor is connected to its turbine by a flexible-plate coupling. The l.p. compressor and the alternator are connected by a semi-flexible coupling. The whole plant is lubricated by means of a gear type pump, mounted on the inlet end pedestal and gear-driven from the main shaft of the l.p. turbine. For starting and for barring after shutting down there is an auxiliary lubricating oil pump, motor-driven and of the same capacity as the main pump. When the speed of the l.p. line is sufficient, the auxiliary pump automatically cuts out and the main pump meets the duty.

Barring of the h.p. line is effected by the starting motor. The l.p. line is barred by a separate motor mounted on the turbine pedestal and driving on to the shaft coupling through a double reduction worm gear. A jacking pump is installed to supply the bearings of the l.p. line during low speed barring.

The intercooler consists of four nests of wire-wound still-type brass tubes, each nest containing 232 tubes 12ft long between brass tube plates. The tubes are of 1in



General arrangement of 15 MW gas turbo-generator set

outside diameter and 18 s.w.g. thick. The casing is of welded steel construction and the water headers of cast iron. The water inlet and outlet are at the top of the cooler, inducing a two-flow circulation through the tubes. The bottom header is of the floating type; thus difficulty should not arise owing to relative expansion of the tubes and shell. The total weight of the intercooler is 27 tons.

The heat exchangers are six in number and are mounted vertically; each contains 2,005 mild steel tubes of 1in outside diameter and 16 s.w.g. thick, the distance between plates being 21ft. The total tube surface is 66,100 sq ft. The hot gas flows through the tubes and the h.p. air (143·33 lb/sq in (abs.) and 167 deg C) to be heated over the outside of the tubes. The arrangement very closely approaches contra-flow, the air entering the top and leaving the bottom of the casing while the hot gas enters the tubes at their bottom ends and leaves at the top. An internal liner fitted with spaced rings, shaped to register with the outer tubes, confines the air flow in the tube nest; a gland is fitted between the shell and the internal liner for the same purpose. The tubes are expanded into steel plates at both ends, relative expansion of the tubes and shell being met by means of a gland between the tube plate and shell at the top end. Tube spacing is maintained throughout the length by transverse corrugated strips, which also facilitate replacement of individual tubes.

The heat exchangers have an overall height of 24ft 5in, a diameter of 5ft and weigh 23 tons each. Each is mounted on four radial foundation guide plates to allow for expansion while maintaining the exact position.

The main combustion chamber is mounted in a vertical duct connecting the top heat exchanger air bus-main and the h.p. turbine inlet. It consists essentially of an outer casing of mild steel 42in in diameter and an inner primary-chamber wall of stainless steel. The inlet air is admitted to and gradually mixes with the products of combustion through a series of apertures in the inner wall. The fuel jet operates with down stream injection and consists of four main burners and one auxiliary, or idling, burner, the latter being sufficient to keep the plant in idle operation.

The reheat chamber is differently constructed in view of the higher inlet gas temperature. The gas is caused to swirl as it enters the main cylindrical body of the chamber through two side openings: the release of this rotational motion causes effective mixing of the combustion products with the incoming gas. Only one burner, a

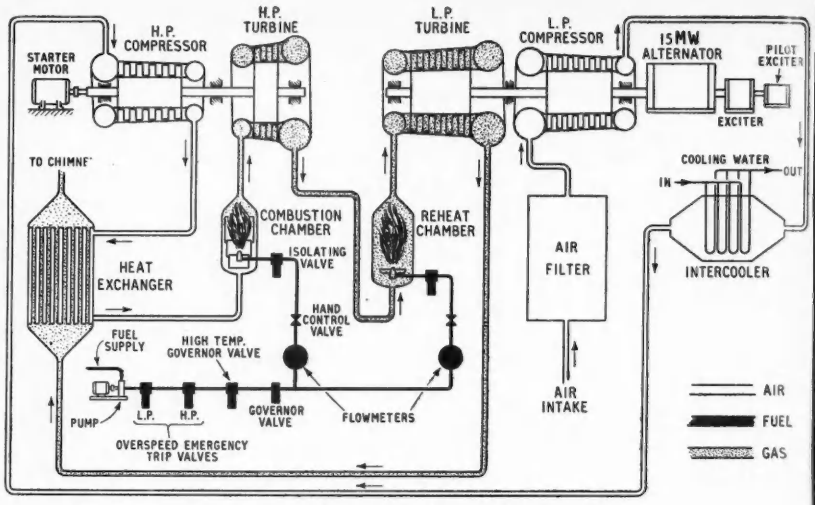


Diagram of air, fuel and gas flow for gas turbo-generator set

combined main and ignition jet, is used in this chamber.

The ducting between the main combustion chamber and the h.p. turbine and that between the reheat chamber and the l.p. turbine are lagged internally and externally. One of the major problems in large gas turbine installations is to ensure adequate flexibility of the large diameter ducts. They are often of considerable length and, besides being subject to extreme change of temperature, have to cater for considerable axial movement of the plant components. For the Trafford installation, where the duct diameter is 54in, Metropolitan-Vickers introduced a new type of flexible expansion piece. It consists essentially of two annular discs of steel plate which are pivoted at the inner edges to the duct itself and at the outer edges to an intermediate ring; these form a flexible collar, annular discs of thin flexible metal providing the necessary gas seal at the pivoting points. The duct can flex by straining the annular discs to concave or convex formation as required. The maximum stress in such a construction is, for equal flexure, far less than would occur in a conventional corrugated section.

The fuel storage tanks are situated on the remote side of the adjoining canal and a smaller service tank is accommodated in the foundation of the stack adjoining the engine room. A float-operated switch maintains a suitable level of fuel in the service tank by starting and stopping a motor-driven pump near the storage tank.

The control of the fuel system is extremely simple and very flexible; it has been designed for use on both distillates, such as gas oil, and on pre-heated residual fuels. From the service tank fuel flows by gravity through filters to two motor-driven Towler pumps each capable of delivering 1,686 gall/hr against a pressure of 1,000 lb/sq in. One pump alone is sufficient to meet the requirements of the plant; the other is brought into service automatically should fuel pressure drop.

From the pumps the fuel passes through two overspeed emergency trip valves, one for each turbine. These follow normal steam practice, the fuel valves being held open by lubricating oil pressure and tripped by the release of this pressure in the event of overspeed through either of the turbine governors.

From the emergency trip valves the fuel goes to the temperature-control fuel valve, the purpose of which is to regulate admission so as to prevent excessive gas temperatures in the turbines. The fuel then passes to the balanced needle constant speed governor valve, which is operated directly from the speed governor arm, the considerable force available rendering the use of a relay mechanism unnecessary.

The governor is gear-driven from the l.p. turbine spindle and is mounted on the inlet end pedestal near the main oil pump. The needle of the fuel valve is profiled to give a straight-line relationship between the load and governor arm travel; " speeder " gear is incorporated for operation both by hand and remote electric control.

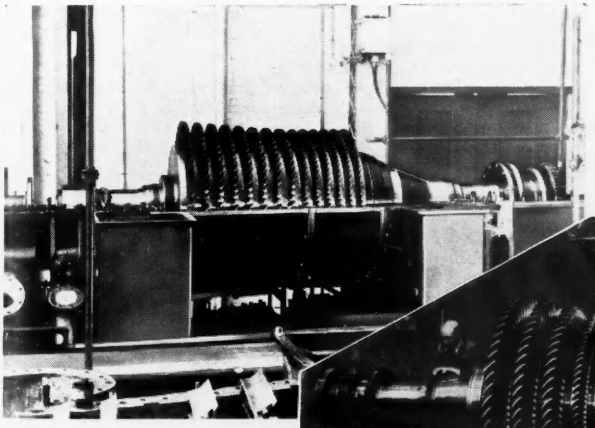
From the governor valve the fuel divides, one line going to the main combustion chamber and the other to the reheat chamber, in each instance passing through flow meters, which can, however, be isolated when residual fuels are used. The main fuel supply to each chamber passes through a hand control valve and an isolating valve, a tapping upstream from the hand control valve of the main chamber supplying fuel to the auxiliary burner. Between these valves connections are taken to pressure gauges fitted with electrical contacts, so arranged that if the hand valves are in the open position during an attempted start, the build-up of pressure will cause the contacts to break and render the start ineffectual; thus the set cannot be started with the hand valves open, which would result in premature admission of fuel to the main burners.

To simplify the control system further these hand valves are situated in the control desk, obviating remote control mechanisms. The isolating valves are controlled by magnet valves which, when switched on, admit pressure oil to the operating servo-cylinders and thus open the isolating valves. The switching off of the magnet valves and the closing of the isolating valves release the fuel in the pipe line to the drain tank.

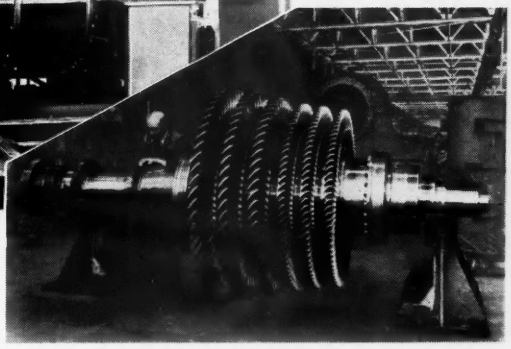
A number of interlocks are provided to safeguard the set against a wrong sequence of starting operations. Thus for barring, the starter motor is interlocked with the auxiliary oil pump and one of the circulating water pumps, so that the starter motor cannot run unless these two pumps are running. For starting, the starter motor is interlocked with the electrostatic air filter, the l.p. line barring motor, one of the main fuel pumps and one of the circulating water pumps. A further interlock ensures that the reheat chamber cannot be lit before the main chamber.

The a.c. generator is rated at 17,650 kVA, 6·6 kV, three-phase 50 c/s, and is directly coupled to the gas turbine. It is of standard M-V construction with a welded stator frame. The stator winding is of the involute type and a closed circuit ventilation system is provided with a water-cooled air cooler mounted in the foundation below the machine. Cooling air is re-circulated by fans mounted on the ends of the rotor.

Excitation is obtained from main and pilot exciters, both directly coupled to the main generator shaft. The rotor sliprings are situated one at each end of the rotor.



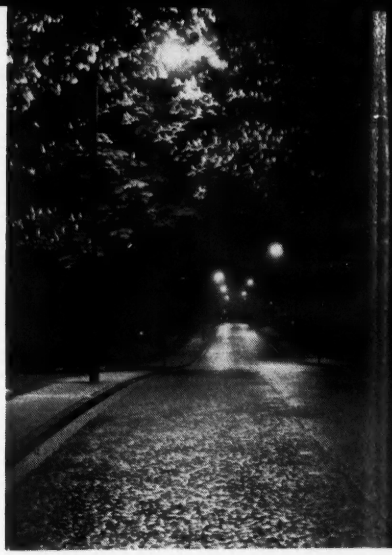
Low-pressure compressor during assembly



Rotor of low-pressure turbine

Public Lighting Conference

Preview of the Exhibition



ON Tuesday next the annual conference of the Association of Public Lighting Engineers will open at the Royal Hall, Harrogate, with the annual general meeting at 10.30 a.m. Following the induction of the president, Mr. E. Howard, city lighting engineer, Nottingham, the conference and its associated exhibition will be officially opened by the Mayor of Harrogate, Councillor A. V. Milton, J.P.

In the afternoon Mr. Howard is to deliver his presidential address and a paper will be read by Mr. N. Axford, district manager, Plymouth, South Western Electricity Board, on "Methods of Controlling Street Lighting." A civic reception will be held in the evening.

"Illuminations and Decorative Lighting" is the subject of Wednesday morning's paper by Mr. H. Carpenter, illuminations and decorative lighting officer, Blackpool. Dr. A. F. Dickerson, general manager, Lighting and Research Department, General Electric Co., U.S.A., will speak on "Street Light—U.S.A." in the afternoon.

Thursday morning's session includes a paper by Mr. N. Hudson on "Street Lighting—A Wise Compromise." After the annual luncheon at the Cairn Hydro Hotel, the afternoon will be left free for the inspection of the exhibition and display of lamp columns and tower wagons. There is to be a reception by the president and Mrs. Howard in the evening.

A paper by Mr. D. F. Orchard, of the Cement and Concrete Association, on "Know Your Materials: Design, Manufacture and Erection of Concrete Lighting Columns" occupies Friday morning. After the conclusion of the conference business there will be a coach tour in the afternoon to Fountains Abbey.

About forty manufacturers are participating in an exhibition being held in a marquee adjacent to the conference hall, lamp columns and tower wagons being on view nearby. A few private displays of equipment have also been arranged.

How street lighting by electricity improves road safety is illustrated on the British Electrical Development Association's stand by diagrams showing the electric lighting of various types of roads in accordance with the British Standard Code of Practice (No. 104, Part 1, of 1952). A photographic display shows fluorescent lighting applied to residential and shopping areas where amenity is as important as safety. The lighting in Crawley New Town is instanced as an excellent example. Among unconventional methods of street lighting dealt with is the unobtrusive effect obtained when fluorescent lamps are mounted on the sides of houses lining the roads. A chart indicates how the ever-increasing efficiency of electric street lighting helps to save the nation's fuel.

A feature of the lanterns shown by the General Electric Co., Ltd., is the increasing use of "Perspex" and die-cast alloys. It is generally agreed that post top lanterns are more pleasing than those supported on brackets, and the Z.5640 and Z.5630 post top lanterns are on view, the latter making its first appearance. The Z.8441 vertical post top lantern for four 2ft fluorescent is also shown, together with Z.8243/4, its horizontal counterpart for two lamps.

Sodium Group "B" lanterns include Z.9446, an enclosed lantern for 45 W and 60 W lamps mounted horizontally in a "Perspex" dish to which are bonded "Perspex" refractor plates. Another newcomer is the all plastic Z.9720 (illustrated), an open lantern for small sodium lamps. For more conventional side street lighting with tungsten lamps and 80 W and 125 W mercury lamps, Z.5500 cast iron "Brookvale" lanterns are presented, which can be used with a one-piece bowl refractor or combination of dome and globe. Another exhibit is the Z.5560, a completely redesigned model in cast aluminium of the "Wembley" and "Oxford" combinations.

The main theme of the Philips Electrical, Ltd., stand is sodium lighting for road safety and there is an exhibit indicating the relative efficiencies of various light sources as used for street lighting. Also on view is the first of the company's Coronation decoration plaques. This is made of plaster and comprises a laurel wreath illuminated by coloured sign lamps and surmounted by a crown. The wreath encloses a sculptured low-relief portrait of the Queen.

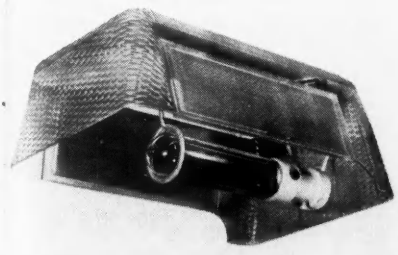
The Engineering & Lighting Equipment Co., Ltd., is showing several new lanterns, among which are models for 45/60 W sodium and 100 W tungsten filament lamps. Lanterns from the company's standard range are also on view, including the new styled model of the "Welwyn." Improvements embodied in the new "Welwyn" lantern include the remodelling of the external lines to improve its appearance. The springs of the refractor retaining clips have been concealed within the body casting, thereby eliminating congestion in the interior of the lantern and protecting the springs against atmospheric conditions. These modifications also apply to the "Ware," "Letchworth" and "Baldock" lanterns. The new "Golden Ray Mark III" lantern (illustrated) is made in two sizes (a) 45/60 W SO/H and (b) 85/140 W SO/H to give a perfect match between Group "A" and "B" installations. The body is die cast aluminium alloy, and is available for top or side entry suspension. It has a "Perspex" enclosing bowl and refractor panels. Also designed for use with horizontal burning sodium lamps is the "Harlow" lantern, with "Perspex" refractor panels; the leak transformer and condenser are housed within the body casting.

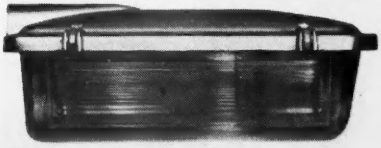
The keynote of the display by Thorn Electrical Industries, Ltd., is Coronation year floodlighting and the exhibit includes a comprehensive range of tungsten filament and fluorescent floodlights, tubes and lamps. There is also a demonstration of colour-changing floodlighting in association with a waterfall, ultra-violet light, etc.

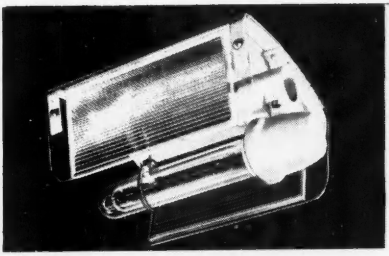
At last year's conference the Metropolitan-Vickers Electrical Co., Ltd., introduced the "Trafford II" lantern to replace the original "Trafford" bowl refractor lantern, and installations of this new lantern are now in service. Designed for use with 250 or 400 W MA/V lamps burning horizontally with a magnetic arc control device, or for MA/U lamps which dispense with this device, the "Trafford II" incorporates many new features including an entirely new optical system using reflectors and an outer glass bowl of special finish which ensures maximum use of the light flux with avoidance of glare.

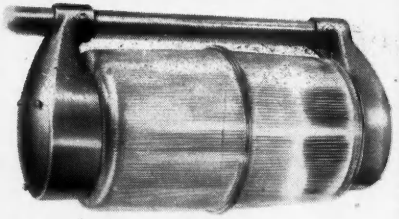
The "SO Fifty-Two" side entry open

Left: **G.E.C. Z.9720 lantern for side road lighting.** *Right:* **E.L.E. Co. "Golden Ray Mark III" lantern**









Left: **Metrovick " SO Fifty-Two " side entry lantern for 45/60 W sodium lamps.** *Right:* **Holophane sodium cylindrical refractor street lantern**

type lantern also introduced last year for 85/140 W sodium discharge lamps is now available in a smaller size for 45/60 W lamps (illustrated) and both sizes can be supplied for top entry. The " SO Fifty " lantern can also be seen, together with the " SS Fifty-One," for tungsten or mercury lamps and the " Borough " for fluorescent lamps, both for Group " B " roads.

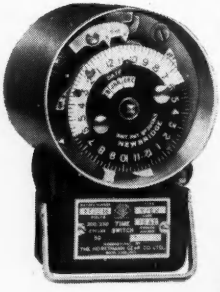
Three new lanterns are among " Mazda " lamps and lighting equipment shown by the British Thomson-Houston Co., Ltd. Apart from open and enclosed types of sodium fittings there is a lantern for Group " A " roads available for operation with two or three 80 W 5ft fluorescent lamps. The lamps and three associated polished anodized aluminium reflectors are mounted to form a single optical system.

The main chassis is steel with a " pyluminized " aluminium canopy and a " Perspex " cover-bowl diffuser at each end. Instant-start lamp auxiliary gear is mounted on removable trays in the body of the lantern, and internal cantilever bracket mounting gives improved daylight appearance. Other exhibits include floodlights and coloured lamps suitable for the Coronation celebrations.

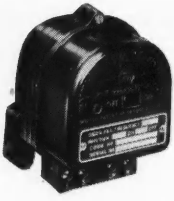
On the stand of the Edison Swan Electric Co., Ltd., the totally enclosed SSA/1 lantern (illustrated) for the accommodation of a horizontally operated sodium discharge lamp is to be seen in two sizes suitable for Group " A " and " B " applications. The lantern incorporates a unique method of securing the " Perspex " enclosure, with its sealed refractor plates, to the housing. The self-supporting sliding action minimizes the risk of breakage while servicing under adverse conditions. For Group " B " road lighting an attractive open type lantern (BT20) can be supplied with either a glass or " Perspex " globe. Other lanterns are separated into types for top or side entry.

Special attention is drawn to a modified sodium cylindrical refractor lantern (illustrated) on the Holophane stand. With its prisms protected on the interior surface it presents a smooth exterior for ease of maintenance and controls the entire light emission from the lamp. Rotation of the refractor enables the correct angle of incidence of the main beams to the road surface to be maintained on all road gradients.

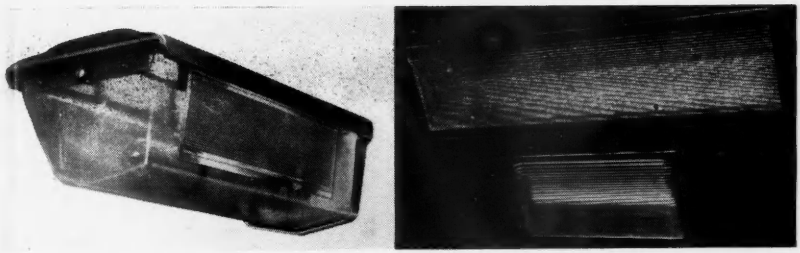
Two new post top lanterns, for use with either tungsten filament or sodium lamps, maintain a two-way non-axial light distribution. Other Holophane exhibits include a horizontal mercury discharge lantern, an acorn bowl refractor lantern for 1,000 W lamps, and a wide range of refractors. Coronation floodlighting is anticipated by the showing of 500 W and 1,000 W floodlights. The new " Lumilux " also contributes to the general lighting of the stand.



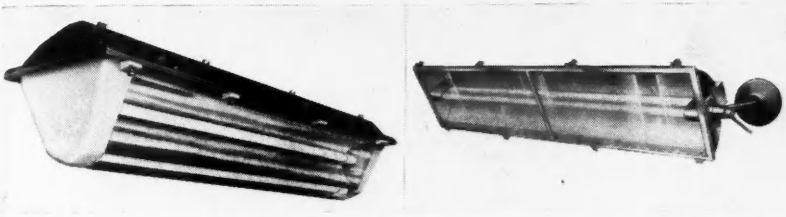
Horstmann Type V electrically wound time switch with solar dial



Automatic Telephone & Electric Type 46 control switch



Left: **Ediswan SSA/1 lantern for horizontally operated sodium discharge lamps.** *Right:* **" Perspex " refractor ware (I.C.I.)**



Left: **" Mazda " three-lamp fluorescent fitting for lighting Group " A " roads.** *Right:* **Revo C13740 fluorescent lantern for wall mounting or for use as a floodlight unit**

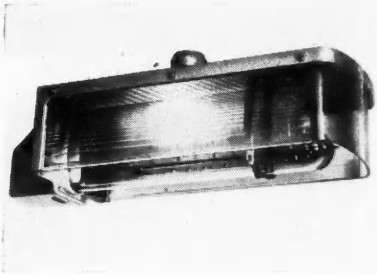
Among the comprehensive range of street lighting equipment chosen for display by the Revo Electric Co., Ltd., are the " Festival " vertical fluorescent unit housing four 5ft tubular lamps in moulded " Perspex " with cast aluminium dome and base; a new cut-off unit for a 250–400 W mercury lamp; " Silverblue " fitting for 250–400 W mercury lamps, a die-cast lantern with stainless steel dual reflector system, which, in conjunction with prismatic and plain glass panels, usefully controls all available light and eliminates glare; new lanterns for 45–140 W sodium, 150 W tungsten and 80 W mercury lamps; one of the " Sol-Etern " lanterns for three 80 W 5ft fluorescent lamps; a new fluorescent lantern for two 80 W 5ft lamps designed for wall mounting or as a floodlight unit (illustrated); and a general purpose floodlight fitting. An outdoor display includes specimens of the above lanterns on iron, steel and concrete columns of the " Festival," " Woolwich," " Vanguard," " Angelo " and " Scopas " types.

Accompanying the " Wilton-Sieray " 3480 lantern for Group " A " roads and two types of " Wilton-Sieray " 240 lantern for Group " B " installation on the Siemens Electric Lamp & Supplies, Ltd., stand are a recently designed fluorescent post top fitting for 24in fluorescent tubes and the DEV/038 sodium lantern incorporating " drum " prismatic glassware and using a sealed optical system. The modified " Newton-Sieray Minor " lantern, a new range of choke coils, floodlights and Coronation devices can also be seen.

The " Crompton Concept " to be demonstrated in the Crompton conference room at the Cairn Hydro Hotel represents a new approach to the lighting of both main and side roads. In addition, Crompton lanterns of conventional styles both in the outdoor column display and in the main exhibition include the latest models of the " Taurus " side road lantern, a single-piece bowl refractor lantern for 100/200 W tungsten lamps or 80 W or 125 W mercury lamps; the " Corona II " main road lantern and enclosed " Perspex " bowl refractor lantern for 85/140 W sodium lamps; the " Capella II " main road lantern, an open counterpart of the " Corona II " with sealed " Perspex " plates; and the new " Aries " prismatic glass drum refractor lantern for 85/140 W sodium lamps, the drum of which can be rotated so that the light beams can

be projected in relation to the road gradient, thus minimizing glare on steep gradients.

The principal exhibit of Falk, Stadelmann & Co., Ltd., will be the "Fulmar" refractor lanterns for horizontally burning sodium discharge lamps. There are now three in this range, two 85/140 W lamp models for Group "A" roads, one having a 1½in side entry and the other top entry, and a top entry 45/60 W lamp model for Group "B" roads. All can be connected directly to standard concrete or steel columns without any alteration or adaptation. The top entry model (screwed either 1in or 1¼in B.S.P.) for Group "A" roads is being exhibited for the first time. Provision is made for diverting any moisture entering through the bracket without affecting the lantern or lamp. "Fulmar" lanterns (illustrated) are of the open bottom type, the prisms of the refractor plates being hermetically sealed between plate and clear "Perspex" outer cover. The combination of aluminium alloy and "Perspex" makes these lanterns exceptionally light in weight.



Falk, Stadelmann "Fulmar I" top entry lantern for Group "A" roads

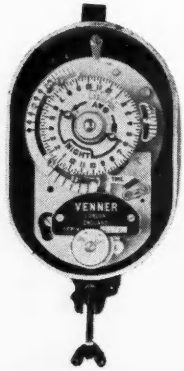
Included in a range of other lanterns on display for Group "A" and "B" roads for tungsten and high pressure mercury vapour lamps is the "Stirling" lantern available with dome refractor and clear globe for 300/500 W tungsten lamp or with bowl refractor for 250/400 W h.p.m.v. lamp. This lantern can be supplied also with opal bowl for 300/500 W lamp for industrial use. The hoods of all three types are of cast aluminium alloy.

Display panels on the I.C.I. Plastics Division stand stress the suitability of "Perspex" acrylic sheet for street lighting. Its mechanical properties and its performance in service are demonstrated, emphasizing the material's ability to withstand varying climatic conditions, industrial pollution and the effect of sea air. Exhibits of "Perspex" refractor ware (illustrated) show how it controls light. In an experimental and development section are displayed bowls and lanterns designed and made in the Division's technical service laboratories.

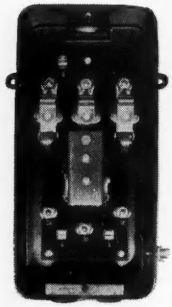
As moulders and fabricators of thermoplastic material Wokingham Plastics, Ltd., are including on their stand a representative lantern from all the leading fittings manufacturers. In addition, there are reflectors moulded in "Perspex" designed and manufactured for Utilities (London), Ltd., which has recently obtained an Air Ministry contract and has supplied them to most of the atomic research stations.

The Stanton Ironworks Company's display of eight spun concrete lighting columns includes four new designs of 25ft columns and brackets which have received the approval of the Council of Industrial Design. Other columns include one No. 6B

Left: **Venner TJSSP switch with cover removed**



Below: **Gowshall illuminated beacon globe with switchgear box**



Left: **Satchwell RA3 contactor used for street lighting control**

narrow base, mounting height 25ft, and three No. 7 columns with a mounting height of 15ft.

Stewarts & Lloyds, Ltd., are exhibiting a selection of their standard tubular steel street lighting columns, including eight for Group "A" roads and four for Group "B" road lighting. Columns of the plain circular and fluted shaft types are shown complete with a selection of the latest fluorescent, pendant, side-entry and top-mounting lanterns lent by various manufacturers.

The "Adastra" galvanized sectional steel columns shown by Poles, Ltd., include circular and hexagonal types covering Groups "A" and "B" road lighting. There are also floodlight towers which can be supplied in all heights up to 70ft.

Four types of concrete lighting columns have been chosen for display by the Springbank Quarry Co., Ltd. Two are designed for a 25ft mounting height: Type C, with a 4ft 5in outreach bracket, polished red granite finish, and fitted with a G.E.C. Z.8431 "Dioptrion" top entry lantern; and Type H (narrow base), with a 3ft 6in outreach bracket, polished grey granite finish, and fitted with a "Metrovick" TD11 20/1 "Trafford Two" side entry lantern. The other two models are for a 15ft mounting height; Type A.E.1, with a smooth grey granite finish, fitted with a G.E.C. Z.5640 post top lantern; and Type F, with a 1ft 6in outreach bracket, polished grey granite finish and fitted with a "Metrovick" "S.S. Fifty-one" top entry lantern.

Both pre-stressed and pre-cast concrete lighting columns are featured by the Costain Concrete Co., Ltd. For Class "A" road lighting there are being exhibited three pre-stressed columns with a mounting height of 25ft and 2ft 6in, 4ft and 6ft outreaches, while for Class "B" road lighting, two 15ft mounting height columns are on view, produced in pre-cast concrete with a 1ft 6in outreach bracket and a specially introduced "C" type bracket. In the pre-stressed columns, which are made by the "long line" stressing method, the concrete is in a state of compression at normal handling or working load. Thus, when subjected to bending during handling, transporting or erecting, no portion is in a state of tension and cracks are avoided.

Of topical interest on the Venner stand is a complete range of flashing and lighting equipment for "Zebra" crossings. The latest small nine-hour solar-dial spring-reserve time switch, the "TJSSP" (illustrated), is entirely automatic and is unaffected by supply stoppages, and eliminates the need for and consequent cost of constant resetting. The newly designed cam-operated solar dial gives an unusually accurate approximation of true solar time, thereby securing a considerable saving of electricity. The switch, which is available in alternative types of boxes and with hand-set dial, is also suitable for peak period cut-off of immersion heaters and other highly loaded equipment. Being of plug-in design, it may be removed and replaced on site without disturbing the wiring or containing case.

Other Venner exhibits are alternative time switches and a selection of clocks, including synchronous without spring reserve, synchronous with 30 hours' spring reserve, spring driven electrically wound with 36 hours' spring reserve, and 15- and

Costain pre-stressed and pre-cast concrete lighting columns, and (*right*) Type H (D.A.) lighting column exhibited by the Springbank Quarry Co., Ltd.

35-day hand-wound types. These clocks can be fitted to single-, double- and triple-pole switchgear with capacities from 5 to 400 A.

Time switches have been developed by the Horstmann Gear Co., Ltd., to meet all the exacting requirements of modern lighting control and its range covers hand-wound models (15, 21 and 40 day run) electrically wound models and synchronous motor driven models with or without spring reserve. An electrically wound time switch with spring reserve is claimed to be the smallest and most compact model of its type on the market.

The Automatic Telephone & Electric Co., Ltd., is showing its "Rythmatic" ripple control system, the main feature of the exhibit being the "Type 46" control switch which can be accommodated in the same space as an ordinary time switch and readily mounted in existing housings.

Among the "Gunfire" products shown by the Automatic Light Controlling Co., Ltd., is the EW/10 electrically wound time switch with 4 days' spring reserve and the GF/3 with 24 hours' reserve.

Apart from the latest illuminated guardposts and the new "Signlite" lighting units for externally illuminating all traffic signs, Gowshall, Ltd., has a comprehensive display of centre island and lighting columns, floodlight fittings, and acrylic plastic beacon globes suitable for illuminating "Zebra" crossings. The illuminated guardposts include the "50" model in which no components protrude, not even hinges.

"Satchwell" single-, double- and triple-pole contactors (illustrated) for street lighting control are being shown by the Rheostatic Co., Ltd. Their robust construction, together with their silence in operation and trouble-free performance for long periods, are features of particular value in this application.

Two "Gibson" alloy tower ladders are demonstrated by Beresford Atkinson, Ltd.: the standard Mark 1 towing model and the latest self-propelled model. Both models can be operated comfortably by one man and can be modified to suit individual requirements.

Three tower ladder units which Shaftesbury Ladders, Ltd., has available for inspection include two trailer models and a fully mobile unit incorporating a 3 h.p. engine.

LIGHTING NOTES

THE main streets of BATHGATE, West Lothian, are now lit by electricity for the first time, the conversion from gas having taken place on 22nd August. Fluorescent lamps have been installed in the shopping centre and sodium lamps in the remainder of the streets affected, in which there are 142 lamp standards. At FORFAR also a new fluorescent installation, recently switched on by Provost A. C. Smyth, marks the first electric street lighting in the town; ultimately there is to be a complete change-over to electricity.

READING Corporation Housing Committee reports that the Ministry of Housing and Local Government has approved a proposal for the installation of street lighting on the Bath Road housing estate, site No. 7, by direct labour at an estimated cost of £3,200.

DARLINGTON Corporation has approved a revised scheme at an estimated cost of £4,470 for street lighting in Coniscliffe Road.

A scheme for floodlighting a number of public buildings in Aberdeen was inaugurated last week by the Lord Provost. The buildings include the public library, His Majesty's Theatre, tower of the Town Hall, South Church and the spires of two other churches.

The BLACKPOOL illuminations, which began on 4th September, will consume 75,000 kWh a week, the total loading being 2,300 kW. The equipment includes 75 miles of cable and wiring, 50 miles of festoon strip, 30 searchlights, 1,500 floodlights, 1,000 decorative designs, 1,000 tableaux and features, and 800 pylons and columns of light.

SOUTHPORT pier illuminations, which incorporate 9,000 multi-coloured lights and have cost £4,000 to erect, were switched on on Friday, 29th August. At the entrance there are cascading fountains and waving banners, while the pier itself is covered by an archway of lights. There are several animated set-pieces.

SUNDERLAND Corporation is hoping that half a million people will visit Roker and Seaburn to see the Corporation's four weeks' illuminations display which lasts until 4th October. Some members of the Council are opposing the annual display and if this year's show also results in a deficit it is expected that another move will be made to abandon the project. Last year 480,000 people visited the display.

VIEWS on the NEWS

By REFLECTOR

THERE were many matters of importance in the Anglo-American Council on Productivity's report on the steps taken by the British electricity supply industry to adopt American ideas where they were applicable here. Yet the point which seemed to appeal to all the organs of the lay Press was that the Americans did not use prepayment meters and that the Electricity Boards in this country were also considering their abolition. I should have considered this a comparatively unimportant matter and, in any event, one in which the ideas of the American and British public probably differ.

* * *

An article in the August issue of the South Eastern Electricity Board's magazine opens thus:—

> "'Electricity, what's that got to do with farming?' So spoke a farmer's wife on approaching Seeboard's stand at the Royal Counties Agricultural Show."

With every farmer in the country clamouring for electricity, where can this lady have been?

* * *

Battersea power station's fourth quarter is under way, but although I must welcome this addition to Britain's power supply I still feel that Battersea will not be what it was. I do not look forward to the "fearful symmetry" of four chimneys which will make it look like the Lots Road station on the other side of the Thames. There is something appealing in the irregularity of the three shafts.

* * *

Mr. G. Nabarro, M.P., has admitted his failure to persuade the Midlands Electricity Board to give a supply to Stoke Bliss, which is in his constituency, earlier than 1956. He said that the position had arisen because the Board was almost an autonomous or self-governing body; until Electricity Boards were subject to more Ministerial control they would be able to do precisely as they liked in matters of rural electrification. Does Mr. Nabarro suggest that particular districts, backed by their M.P.'s, should be allowed to "jump the queue"? He must know that the demand for electricity comes from practically all country areas and that capital restrictions have put a brake on rural electrification.

* * *

Many British people with "topical" names have reason to resent their parents' choice—particularly the feminine sex who may thereby be "dated." But how much more resentful will the little Russian (mentioned by the *Manchester Guardian*) be when he grows up with the name of "Electrification." This is even worse than the appellative excesses of the Cromwellian period. I trust that British electrical parents will refrain from this form of propaganda, even if Eda or Elma, or maybe Beama at a stretch, might be considered suitable names for girls.

* * *

A correspondent tells me that burned out slag from an 80-year-old "muck stack" at Sharlston Colliery, near Wakefield, is being used in the large-scale levelling operation on the site of the power station to be built at Heath Common on the outskirts of Wakefield. Some 140,000 tons of material will be required which will entail about 28,000 lorry trips. During the first eight weeks an average of 2,800 loads a week were moved. Using twenty-one lorries, the best day's work so far has been 587 loads. I hope the amenity societies will take due note of this contribution by the British Electricity Authority towards cleaning up the countryside.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE appointment is announced of **Mr. B. C. Orford,** M.Sc., A.M.I.E.E., as patents manager to Power Jets (Research & Development), Ltd. Mr. Orford, a Cornishman, was educated at Truro School and the University of Bristol. During the early war period he worked in the Transmission Department of the G.E.C., Coventry, and later served in the R.N.V.R. as air electrical officer. After the war he became a development engineer with Waymouth Gauges & Instruments, Ltd., and in 1947 joined the Patent Department of Standard Telephones & Cables, Ltd. He went to Power Jets in March, 1951.

Mr. N. C. Robertson, Director-General of Electronics Production, Ministry of Supply, left by air on Tuesday last for a four-week visit to the United States and Canada. He is to exchange information on electronic manufacturing techniques and discuss standardization of equipment between Britain, Canada and the United States.

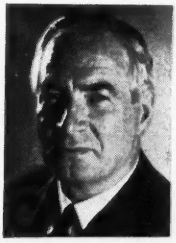
Mr. A. M. F. Palmer, A.M.I.E.E., technical editor and director of studies, Electrical Power Engineers' Association, has been selected by the Cleveland Divisional Labour Party as its candidate in the forthcoming by-election in the division. Mr. Palmer was formerly with the London Power Co. and represented Wimbledon in the House of Commons from 1945 to 1950.

Mr. Alfred Brown retired at the end of August from the position of senior sales representative with the Sloan Electrical Co., Ltd. The company's association with Mr. Brown is to be continued in the person of his son, **Mr. Stewart A. A. Brown,** who has been appointed sales representative for Essex with effect from 1st September. He will be operating from the company's Leyton depot at 6, Albany Road, London, E.10.

Mr. A. Brown

Mr. S. A. A. Brown

On 1st September **Mr. G. Dring,** M.A., B.Sc., F.R.I.C., M.I.Chem.E., F.P.I., completed twenty-five years' service with Bakelite, Ltd., and at a private lunch, attended by senior executives of the company, he was presented by Mr. H. V. Potter, chairman and managing director, with an engraved gold watch.

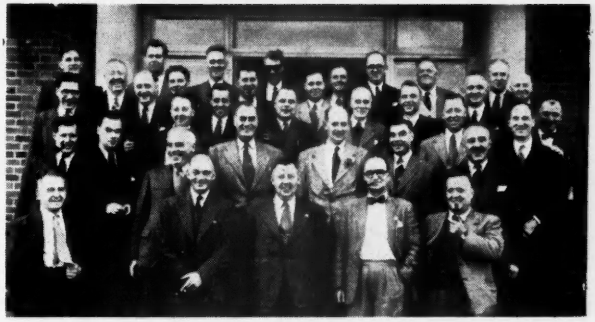


Mr. G. Dring

After taking an honours degree in chemistry at Trinity College, Cambridge, Mr. Dring joined the Damard Lacquer Co., in 1921 as research chemist. Two years later he went to Manchester with the Bradford Dyers Association, and returned to the plastics industry in 1927 following the amalgamation of the Damard Lacquer Co., and Mouldensite, Ltd., to form Bakelite, Ltd. He was works manager at Darley Dale until 1932, and when the new factory opened at Tyseley, he moved to Birmingham in charge of the Development Department. He was made a director of the company in 1942, and still holds the post of research and development director. Mr. Dring has taken an active part and has held many official posts in scientific and technical societies connected with the plastics industry. He is a vice-president of the Plastics Institute, and chairman of the Plastics Industry Committee of the British Standards Institution.

The British Standards Institution announces the appointment of **Mr. T. R. B. Sanders,** C.B., as engineering adviser to the Institution. Mr. Sanders held a number of key posts at the Ministry of Supply from 1944 to 1951, and was concerned with the technical development of a wide range of Service equipment. While in charge of the Ministry's standardization programme, he came into close contact with the B.S.I. and was for some years a member of the Institution's Engineering Divisional Council. In 1948 he was a signatory, on behalf of the

British Government, of the "Declaration of Accord" by which the American-British-Canadian unified screw thread was established. Mr. Sanders will give first priority in his new appointment to furthering the British end of the current A.B.C. programme for the unification of engineering standards. Subsequently his interest will extend to the whole of the work of the Institution in the engineering field.



Members of the Worcester Electric Club at the works of the Metal Box Co., Ltd., Neath

The resignation of **Mr. W. J. McC. Girvan,** city electrical engineer and manager, who has notified the Belfast Corporation of his intention to relinquish that post as from 30th September next, came up for discussion at the quarterly meeting on 1st September, following a letter from Mr. Girvan in which he stated that he was prepared to carry on his duties as heretofore from 30th September. This letter had been already before the Electricity Committee for consideration, and the Committee rejected it by four votes to two and reaffirmed its previous recommendation that **Mr. R. P. Watson,** Mr. Girvan's deputy, should be appointed city electrical engineer and manager at a minimum salary of £2,300. Alderman E. C. McKee moved that notwithstanding anything to the contrary, Mr. Girvan should be asked to withdraw his resignation and carry on as if that resignation had not occurred, or Mr. Watson nominated to succeed him.

The resolution was seconded by Alderman Lawther, but it was defeated by thirty-one votes to fifteen. A further resolution to refer the appointment back to the Electricity Committee was defeated by twenty-seven to sixteen, two members not voting. Alderman McKee is to raise the question of a public inquiry with the Government of Northern Ireland.

About forty members of the **Worcester Electric Club** recently paid a visit to the works of the Metal Box Co., Ltd., at Neath, South Wales. After lunch at the Castle Hotel, Neath, a tour was made of the factory and the visitors were shown the electrical gear which controls the machines for making components for food and other metal containers. After the tour they were entertained to tea in the works canteen.

Mr. B. W. S. Challans, M.Sc.(Eng)., D.I.C., M.I.E.E., who has been in charge of the B.S.I./C.S.A. Approvals Division of the British Standards Institution, has joined the staff of the Approvals Laboratories of the Canadian Standards Association. After a short period in Canada he will return to London as European engineer of the C.S.A. and his address will then be c/o the British Standards Institution. Mr. Challans was with the Admiralty during the war and is a past chairman of the I.E.E. Southern Centre.

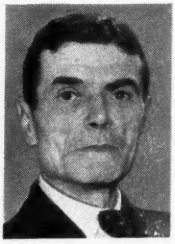
The works and staff of **Dorman & Smith, Ltd.,** held their first sports and gala day on 30th August, at the Crescent Athletic Ground, Salford. The weather was good, and the large number of entries received for the varied athletic events ensured a successful day. Among the subsidiary entertainments, the Punch and Judy show and the donkey rides proved popular with the many children present. At the conclusion of the meeting, prizes were presented by Mrs. R. G. Dale, wife of the company's secretary.

The fourth annual students' social evening of the **Telegraph Construction & Maintenance Co., Ltd.,** was held at Greenwich Town Hall on 4th September. Each student was allowed to bring a guest, and about 120 sat down to the supper which was followed by a concert. The principals of local technical and commercial colleges attended and the company was represented by Dr. E. W. Smith (director) who presented cash awards to successful examination candidates, Mr. F. Leighton (works manager) and the members of the Telcon Education and Training Committee, Mr. J. G. Rochester (chairman), Mr. W. R. Martin, Mr. R. C. Mildner, Mr. P. L. Reed, Mr. G. F. Russell, Mr. H. R. E. Sanders (secretary), Dr. G. A. V. Sowter, Mr. J. Webster, Mr. H. F. Wilson and their ladies.

OBITUARY

Mr. J. A. B. Horsley.—The death occurred at his home on 7th September of Mr. James Arthur Bernard Horsley, O.B.E., M.I.E.E., who was a well-known authority on

the use of electricity in mines. Mr. Horsley was born in 1874; he was educated at Dover College and served his apprenticeship in Manchester. He was then engaged for over four years in electrical work at the Transvaal gold mines, being responsible for one of the first three-phase mine installations. He returned to England in 1899 to join the staff of Robert Hammond and carried out a good deal of electricity supply work. During the 1914-18 war he was in the Royal Navy, serving in H.M.S. *Inflexible*.



The late Mr. J. A. B. Horsley

Mr. Horsley was appointed H.M. Electrical Inspector of Mines in 1919. He reached the normal retiring age in 1939 but was retained by the Mines Department for special duties, including the supervision of methods for ensuring supplies of electricity to mines and, later, the revision of the code of safety regulations governing the use of electricity in mines. He was awarded the O.B.E. in 1930 and finally retired from the Ministry of Fuel and Power in May last. Mr. Horsley was president of the Association of Mining Electrical Engineers in 1937-38.

WILLS

Mr. W. Wilson, D.Sc., M.I.E.E., F.Inst.P., manager of the development laboratories at the Witton works of the G.E.C., who died on 16th May last, left £12,396 gross (£12,318 net).

Mr. A. H. Banks, O.B.E., former chief labour relations officer of the British Electricity Authority, who died on 9th June last, left £8,676 gross (£8,601 net).

Mr. G. E. O. Hansom, engineer and manager of the former Waterloo and Crosby District Electricity Supply Co., who died on 4th May last, left £5,562 gross (£5,318 net).

Mr. J. J. Carter, vice-chairman of Crossley Brothers, Ltd., and chairman of Crossley Premier Engines, Ltd., who died on 7th May last, left £27,094 gross (£26,177 net).

Mr. A. B. Randall, M.I.E.E., formerly engineer and manager of the Salisbury Electric Light & Supply Co., and managing director of the Tisbury Electric Supply Co., 1921-36, who died on 25th April last, left £19,890 gross (£19,778 net).

Mr. Alexander Brown, M.I.Mech.E., technical managing director of Davidson & Co., Ltd., who died on 15th September, 1951, left estate in Great Britain and Northern Ireland valued at £72,711.

Ash and Clinker

Forthcoming Conference in London

PROBLEMS arising out of ash and clinker will be the subject of a conference arranged by the Institute of Fuel for 28th and 29th October at the Institution of Mechanical Engineers. Eleven papers will be presented by their authors in ten-minute abstracts and then discussed. Dr. A. C. Dunningham is chairman of the organizing committee and Dr. D. T. A. Townend will summarize the proceedings.

The effects of ash will be considered in relation to varied aspects, as follows: origin and nature, sampling and analysis (Mr. L. J. Edgcombe and Dr. A. B. Manning); coal preparation (Messrs. A. Grounds and A. M. Wandless); handling and disposal (Messrs. W. G. Marskell and C. W. Pratt); external boiler deposits (Dr. H. E. Crossley); design of plant (Mr. W. F. Simonson); boiler efficiency (Dr. A. C. Dunningham); shell boiler performance (Messrs. E. J. C. MacDonald and M. V. Murray); utilization of high-ash coals (Mr. F. B. Karthauser); atmospheric pollution (Mr. A. Fitton); gas producers (Mr. L. G. Townsend); and coal-fired gas turbines (Mr. T. F. Hurley).

All interested are invited to attend the conference and to contribute to the discussions. Fees will be £1 1s for members of the Institute of Fuel and £1 11s 6d for non-members.

Electricity in Switzerland

AS a result of the favourable economic situation Switzerland's consumption of electric power during the year ended 30th September, 1951, showed an unprecedented increase, according to the *Bulletin* of the Swiss Bank Corporation. Compared with the 10,318 million kWh generated in 1949–50 the 1950–51 figure of 12,191 million kWh represented an increase of 1,873 million kWh or 18·2 per cent. In the main the increase was made possible by the larger volume of water carried by the rivers and only a small fraction (308 million kWh) represented the production of new power stations. Thermal generators, with 56 million kWh (161 million kWh in 1949–50) made only a small contribution.

Normal consumption, i.e., not including electric boilers and pumps, increased from 8,973 million kWh in 1949–50 to 10,429 million kWh in 1950–51, an increase of 1,456 million kWh, and total consumption rose from 9,885 million kWh to 11,554 million kWh (1,669 million kWh increase). Transfers of electric power across the frontier showed an excess of imports of 39 million kWh during the winter half-year (118 million kWh in 1949–50) and an excess of exports of 732 million kWh during the summer half-year (712 million kWh).

National Fuel Policy

Ridley Committee's Recommendations

THE Committee on National Policy for the Use of Fuel and Power Resources was appointed in July, 1951, by the Minister of Fuel and Power to consider possible improvement measures, following a joint approach to the Government by the Federation of British Industries and the Trades Union Congress. The chairman, Viscount Ridley, was a member of the former Fuel and Power Advisory Council (the Simon Committee) which in 1946 reported on domestic fuel policy. Other members of the Committee were: Mr. Lincoln Evans (Iron and Steel Trades Confederation), Mr. N. W. Gardiner (Huntley and Palmers, Ltd.), Sir Claude Gibb (C. A. Parsons & Co., Ltd.), Professor W. R. Hawthorne (Cambridge University), Professor W. A. Lewis (Manchester University), Mrs. M. McIntosh (member of the London County Council) and Miss M. R. Schofield (housing manager, Stoke Newington Borough Council).

Aims Defined

The general aims of a national fuel and power policy are defined as: To meet in full the demands of the community for the different fuel and power services at prices closely corresponding to costs of production and distribution; to provide for export fuels of such types as will yield most gain; to promote maximum economic efficiency in each use of each fuel; and to encourage the use for particular services of the fuel which gives the best returns on the resources consumed.

The Committee foresees a demand for the country's coal at home and abroad of about 260 million tons a year, against the National Coal Board's long-term production plan, related to a demand of 230–250 million tons.

As to whether the price of coal should be raised to promote economy in its use, perhaps by imposing an excise duty of £1 a ton, half the members favoured an increase and the other half opposed it.

Domestic supplies of fuel account for some 30 per cent of the country's total consumption. The Committee concludes "that no fuel or combination of fuels can be selected as the 'best' for domestic uses in all, or most, or even 'normal' conditions" and does not recommend direct intervention by the Government to change the existing practices. It sees a case, however, for charging more for domestic supplies of electricity at peak hours and less at off-peak hours, and proposes measures to raise the efficiency of domestic solid fuel use and of house insulation. These measures include fixing higher standards for the efficiency of domestic fires, encouraging the production of cheap and efficient open fires of a new pattern, and providing financial and other incentives.

British industry uses about 100 million tons of fuel a year. The Committee believes that the average efficiency could be raised, possibly by 15 to 20 per cent, given the right conditions and incentives, and recommends an expansion of industrial fuel efficiency advisory services. Industry itself might undertake this expansion, but the Ministry's present service should be continued and the Government should offer industrial firms loans on favourable terms for installing fuel efficiency equipment.

Competition Beneficial

The Committee favours maintaining competition between the fuel and power industries, because of the importance it attaches both to consumers' "freedom of choice" and to the stimulus which competition gives to efficiency, subject to three conditions: all prices and tariffs for fuel and power should correspond closely to the costs of the services; the fuel industries should not impose on consumers any conditions of supply (including the terms on which connections to new consumers are provided) which may restrict their "freedom of choice" and are not justified by supply costs; full and objective information on fuel services and fuel appliances should be made readily available to the public. On the side of supply, the Com-

mittee finds scope for more co-operation between the different fuel and power industries.

Relating prices to costs may involve changes in present tariffs, and in electricity, particularly, large technical and economic problems arise. To advise the Minister on the general problems of the structure of prices and tariffs the establishment of a small expert but independent Tariffs Advisory Committee is suggested.

The Committee rejects the idea of imposing a co-ordinating body with executive authority over the fuel and power industries as unduly restrictive of their managerial responsibilities and in conflict with the responsibilities to Parliament of the Minister of Fuel and Power. Instead, it recommends the establishment of a Joint Planning Board, composed chiefly of representatives of those industries, to decide, in the light of their expert knowledge, what projects should be investigated as possible joint enterprises.

Appendices include technical memoranda in support of discussions and conclusions in the Report, various documents submitted by the fuel and power industries, and memoranda presented by the Federation of British Industries, the Trades Union Congress, the British Electricity Authority and the North of Scotland Hydro-Electric Board.

B.E.A. Memorandum

The B.E.A. points out that since 1900 the quantity of coal used for generating electricity has increased from 3 million to 35 million tons a year and for gas works and coke ovens from 35 million to 48 million tons, whereas the total increase for the whole country has been only 30 million tons. During that time the population has risen from 37 millions to 49 millions, with improving living standards, and the volume of national production of goods and services has trebled. Fuel consumption per kWh sent out from electric power stations has been reduced from 3½ lb in 1920 to under 1½ lb, and electricity has displaced less efficient methods. This tendency is likely to continue.

Shortage of public generating plant has increased the import of oil fuel. Progress in water power development is slow owing to opposition on the grounds of interference with amenities. Experimental wind generators are potentially capable of saving 250,000 tons of coal per annum. Underground gasification of coal may provide some fuel for gas turbines. The burning of washery slurry at pithead stations would permit extension of electricity supplies without making a new call on fuel resources. Replacement of generating plant more than 25 years old would save one million tons of coal a year. In three years up to and including 1950–51, over two million tons were saved through the installation of modern plant. An overall average thermal efficiency of 26 per cent is expected in 1960 compared with 21·5 per cent in 1950–51. A further contribution to fuel economy is made by burning the lowest grade of coal (likely to increase in quantity) in producing electricity.

Nuclear fission is unlikely to produce energy for many years as economically as existing fuels, but electricity would probably provide the best means for distributing it and nothing should be done to prejudice later rapid development of atomic energy. The high efficiency of electricity in application (which also lends itself to thermostatic control) compensates for heat losses inherent in production by present methods. The B.E.A. holds that consumers are the best judges of what fuel meets their individual requirements. The electricity supply industry has no desire to be protected from competition of the other fuel and power industries.

The North of Scotland Hydro-Electric Board gives the most recent estimate of its potential power resources at 10,000 million kWh per annum. At present the output is 874 million kWh from sixteen water-power stations with a total capacity of 367,500 kW and two stand-by steam stations totalling 120,000 kW. By 1958–60 the hydro-electric capacity will reach 1,100,000 kW producing 3,250 million kWh and saving two million tons of coal per annum. The problem of drying peat has yet to be solved, but an experimental 500 kW gas turbine ran successfully last December on this fuel.

C.I.G.R.E.

THE next meeting, 15th session, of the Conférence Internationale des Grands Réseaux Electriques will take place in Paris from 12th to 22nd May, 1954. Further particulars are obtainable from the British National Committee, C.I.G.R.E., Thorncroft Manor, Dorking Road, Leatherhead, Surrey.

The British Association

Proceedings at the Belfast Meeting

EXACTLY one hundred years ago the British Association for the Advancement of Science for the first time chose Belfast for its annual meeting. It is fifty years since it met there last and it returned this year for its 114th meeting (3rd to 10th September).

The graduation ceremony at Queen's University preceded the inaugural meeting at which the presidential address was delivered by Professor A. V. Hill (Physiological Department, University College, London).

Ethical Dilemma

The President spoke of the ethical dilemma of science and claimed the right to discuss not only scientific facts themselves but their consequences in human affairs. The dilemma was a real one and could not be resolved by any simple expedient. In another form it was perplexing many of those who were concerned with the development of nuclear physics, the ultimate service of which might be very great and possibly essential if our present type of civilization was to continue when other sources of power dried up, while the benefits to medicine and industry were already substantial. But nuclear fission had released the threat of unprecedented violence.

Much scientific and technical advance had led to unexpected dangers and difficulties. Without present knowledge of bacteriology and preventive medicine, gigantic armies could never be kept in the field: was medical science, therefore, to be blamed for twentieth-century war? The indiscriminate use of insecticides, by upsetting the balance of nature, could quickly do more harm than good. Radio communication might be used for spreading lies and disorder as well as truth and goodwill.

Co-operation was required, not conflict, for science could be used to express and apply the principles of ethics and those principles themselves could guide the behaviour of scientific men. Was there really, then, any special ethical dilemma which scientific men, as distinct from other people, had to meet? Professor Hill thought not, unless it was to convince themselves humbly that they were just like others in having moral issues to face.

In his presidential address to Section A: Mathematics and Physics, Professor A. M. Tyndall (Emeritus Professor of Physics, Bristol University) drew attention to contributions to experimental physics from Great Britain. He turned to the programme of the present B.A. meeting and traced some of its items back to their early days, as examples of the striking consequences of following up simple ideas.

The history of electrical discharge in gases, electrical breakdown of gases by disruptive discharge, the physics of the higher atmosphere and others of electrical consequence were mentioned in this way. Then in the second half of the address details of mesons and of three kinds of transient V particles, two uncharged and one charged, were tabulated, together with their probable modes of decay and estimates of their average lengths of life, while the proton, neutron and electron were added for completeness.

Complex Picture

At first sight the table appeared to present a picture of considerable complexity, but closer examination showed that some order was beginning to emerge. Thus the constant appearance of the pi-meson as a product of decay was significant: the zeta-meson, charged or neutral, appeared to decay into two pi-mesons; the tau-meson into three pi-mesons; the chi-meson into a pi-meson and a heavy neutral particle. The decay products of the last-mentioned were now being searched for and it had been tentatively suggested that it might be a neutral tau-meson giving a particular reaction. But there were still some outstanding difficulties. It was possible, for instance, that a particle designated " V " was in some cases identical with one named differently by the Bristol group. In any case a wealth of information

was arising from the study of these collisions of great energy and some remarkable phenomena were now being recorded. It was gratifying to recall that of the eight to ten transient new particles which had been discovered since the war, all but one had been found by experimental workers in the laboratories of Great Britain.

In stressing the fruitfulness of Great Britain's traditional national approach to problems in experimental physics, Professor Tyndall had no wish to exaggerate. But he did believe that they could still feel great pride in Britain's continuing contributions to this subject. And there was something to be said for emphasizing them at a time when in some other respects this country no longer held her former position in world affairs.

Upper Atmosphere Research

At the session on physics of the higher atmosphere, Mr. P. H. Fowler (Bristol University) described balloons for cosmic-ray studies at high altitudes and the nature of the primary cosmic radiation. Dr. S. F. Singer (U.S. Embassy, London) spoke of the way rockets had enabled measurements to be made of atmospheric properties at up to 700,000ft and permitted the study of extra-terrestrial radiation unmodified by the atmosphere. Professor D. R. Bates (Queen's University, Belfast) discussed from the point of view of the theorist some of the controversial topics in upper atmospheric physics. Mr. W. R. Piggott (Directorate of Radio Research, D.S.I.R.) outlined the morphology of the ionized layers in the upper atmosphere and their relation to other geophysical phenomena.

Six papers were submitted at the session on electrical discharges in gases. Professor F. Llewellyn Jones (University College, Swansea) described recent experimental work done towards the elucidation of the fundamental process of electrical breakdown of gases, covering long sparks at high and low voltages as well as microsparks at switch contacts.

Dr. C. Grey Morgan (Royal Society Warren Research Committee, University College, Swansea) dealt with experimental investigations into the mode of occurrence of cold emission from electrodes in gases, its influence on the similarity theorem and on high-voltage high-pressure breakdown.

Dr. R. L. F. Boyd (I.C.I. Research Fellow, University College, London) surveyed some discharge phenomena which called for experimental study of the nature of the ions in the gas, and he also gave an account of recent work on the mass-spectrometer probe.

Professor K. G. Emeleus (Queen's University) concerned himself with ionic oscillations, exhibiting photographs and lantern slides to illustrate some of the features of plasma oscillations of high frequency.

Dr. A. von Engel (Exeter College, Oxford) summarized present knowledge of the physical processes which initiate and maintain electric discharge in gases at low pressure.

Mr. C. F. R. Bruce (E.R.A.) described the conditions in and around, and the field required to maintain, the leader stroke of lightning. He then considered their application to the electric spark.

In his presidential address to Section G: Engineering, Sir Ben Lockspeiser (secretary, D.S.I.R.) reviewed the progress that had been made in aeronautical science and aircraft engineering.

Mr. F. W. Meredith (director, S. Smith & Sons, Patent Holdings, Ltd.) examined the basic principles of servo-mechanisms, methods of design and purposes for which they were employed in aircraft.

Dr. Denis Rebbeck (director, Harland & & Wolff, Ltd.) reviewed ship development and shipbuilding, with particular reference to Queen's Island, claimed to be the largest shipyard in the world.

Lt.-Com. J. R. D. Walker (research manager, Vickers-Armstrongs, Ltd.) dealt with the advance from early steam steering engines to the automatic helmsman and anti-roll stabilizers, mentioning that a powerful design of servo-mechanism for naval gunnery had many applications.

Transmission Line Constants

Dr. R. O. Kapp (consultant, Kennedy & Donkin) returned to the calculation of power transmission line constants, with which he dealt in a C.I.G.R.E. paper earlier this year. He spoke of the interpretation of mathematical expressions in physical terms together with the derivation of simplified formulæ accurate enough for lines up to 600 miles in length.

Professor Kapp said that one of the purposes of the paper was to show that when one had a fuller appreciation of the physics of power transmission one was led to the

presentation of the formulae in forms that were very much easier to handle than were the formulae to be found in textbooks. The formulae could never be simple, because in transmission line calculations there had to be taken into consideration a number of parameters—current and voltage at the sending end, and the length of the line, the capacities, resistance and the inductance per unit length at the receiving end. Therefore "calculations without tears" could not be expected but formulae that were easy to handle could be derived.

Turning to the physics of transmission, the author said that electrical engineering, in its infancy, was d.c. engineering, and thus there was a tendency to approach a.c. problems with what might be called a d.c. mind. Therefore people were inclined to think of a.c. transmitted along a transmission line as d.c. transmission that varied periodically.

The paper was followed by a short discussion.

In Section L: Education, Major-General C. Lloyd (director of technology, City and Guilds of London Institute) surveyed the requirements of industry for higher technological education and assessed the functions of the various educational institutions in satisfying those needs.

Excursions included visits to the B.B.C. studios and Lisnagarvey transmitters, Belfast telephone exchange, Harland & Wolff, Ltd., and the Ballylumford power station.

Next year the B.A. will meet in Liverpool from 2nd to 9th September and in 1954 at Oxford from 1st to 8th September.

New Books

Electricity Meters and Instrument Transformers. By S. James, M.I.E.E. Pp. 467; figs. 205; index. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 50s.

Metering has become a complex matter and for this reason many previous writers, by specializing in subjects near to the heart, have left wide gaps for the reader. Mr. James has avoided this pitfall and dealt adequately with each major section, being careful not to lose the student in abstract theories weighted with pages of obscure mathematics. Where it has been necessary to introduce formulæ and vector diagrams, the explanations are lucid with one's questions answered almost before they arise. The illustrations and gearing diagrams, particularly those of prepayment meters, are again very straightforward, erring, if at all, on the side of over simplicity.

The section on the theory and performance of single-phase meters would alone be a justification for the book, providing, as it does, answers to the problems ever present in meter departments; here the author steps right out of the pages to give assistance where it is most needed.

Demand indicators are adequately dealt with, particularly when read in conjunction with the section on kVA measurement; it has been called "that nebulous quantity," but the author has put it into very clear perspective as he has also done with the descriptions and illustrations of the mechanical features of the instruments concerned.

The approach to instrument transformers is most realistic; more would be appreciated, perhaps at the expense of obsolete meters which are interesting historically, but not so necessary in this essentially modern work. It is a book for the practical meter engineer who is concerned with present day methods rather than advanced theory and design.

Mr. James has wisely deferred the subject of testing for a volume in preparation, which will be awaited with interest by his present readers.—H.E.L.

Definitions and Formulæ for Students: Electrical Installation Work. By F. P. Sexton, A.R.C.S., A.M.I.E.E., A.Inst.P. Pp. 30; figs. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C.2. Price 1s 3d net.

The object of this pocket-sized booklet is to provide in convenient form data necessary to the daily work of young men concerned with electrical installation and wiring. The change in this seventh edition is the entire revision of the graphical symbols necessitated by the issue of B.S. 108: 1950.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Joint Resistance

AN interesting point is raised in Mr. T. C. Gilbert's article (15th August) regarding the apparent failure of the resistance of a joint to obey Ohm's Law. Two explanations occur to me.

The first is that whereas the ohmmeter would operate on 1·5 V d.c., when 15 A was passed I assume it would be obtained from the a.c. mains and then the impedance of the circuit could make a difference.

The other explanation is that a joint may have similar characteristics to a metal rectifier (except that it does not rectify), i.e., non-linear.

If, however, the circuit resistance was measured by using high voltage d.c. but with a resistance in series to limit the current, the resistance would be found to be lower due to the high voltage breaking down any barrier layer.

I have noticed a similar state of affairs when measuring the resistance of circuits consisting of low resistances connected together with nuts and bolts. In the event of a loose contact the value of the resistance increases with the current, but decreases with an increased voltage.

I have not seen anything mentioned on this subject before, but maybe someone has investigated it already.

Birmingham, 26. R. N. TOLLEY.

Regulation 404J

THE inquirer quoted by Mr. D. Clark (29th August), got the same frustrating answer as I did. It is surely obvious that neither of us is referring to surface installations on incombustible surfaces; the regulation is quite self-explanatory in this respect. But the housewife naturally insists on concealed wiring.

The only practicable ways of complying with 404J are: (1) to use surface wiring, or (2) to bring cable(s) through the ceiling, or partition, at the light or switch position, plaster up the hole, run the cable(s) on the surface for an inch or two and then into the pattrass, or (3) use ceiling-rose-cum-joint boxes; and (4) use no insulated switch fuses except " Memac " and " Memspan."

To put a lighting installation in a wooden building you need asbestos patches at each switch and ceiling rose.

No disrespect is intended, but it just is not done, although specifications, Councils, Electricity Boards and insurance companies stipulate compliance.

The eyes must be open to detect even surrounding darkness.

Crediton, Devon. E. H. MARSHALL.

The Reheat Cycle

IN your notes on the reheat cycle (*Electrical Review*, 29th August, page 421), you state that the extent of the thermodynamic and other gains, due " mainly to lower leaving exhaust losses with reheating " have been worked out in my paper on reheating with high steam conditions (*Electrical Review*, 15th August).

It should be noted, when comparing the performance of reheating and non-reheating steam plant, that the gain due to the reduction in leaving and exhaust loss with reheating can be credited in full only if the turbines compared have the same output and exhaust end blading; also, the magnitude of this gain may vary, depending on the size of exhaust end provided by the maker. Consequently, a constant leaving and exhaust velocity equivalent to a loss of 11·2 B.Th.U./lb of steam to condenser has been assumed throughout the paper for both reheating and non-reheating cycles and the gains referred to are, in fact, those due mainly to the thermo-dynamics involved.

Trafford Park, Manchester. J. C. LONDON, *Development Engineer*, Steam Turbine Engineering Dept., Metropolitan-Vickers Electrical Co., Ltd.

Electrical Accidents

Analysis of Principal Causes

DURING 1950 there were 778 notifiable accidents in factories, i.e. those resulting in more than three days' disablement, of which 38 were fatal. From particulars given in the annual report* of the Electrical Branch of the Factory Department it appears that these figures are slightly in excess of a five years' average of 766 and 33. Of the 38 fatalities, 22 occurred at voltages of less than 250 and 11 at voltages between 250 and 650. Apart from 167 non-fatal cases of eye flash from electric welding not classified as to occupation, non-fatal accidents were almost equally divided between skilled and unskilled grades, but 70 per cent of the fatalities affected unskilled men.

Portable electrical machines were the largest single cause of fatalities (11) and switchgear below 650 V of non-fatal accidents (122). Portable apparatus of all kinds and their cables, including plugs and adaptors, were responsible for 16 deaths and 133 injuries. Artificial respiration was successful in 23 instances (17 up to 250 V) and unsuccessful in 23 instances (21 up to 250 V).

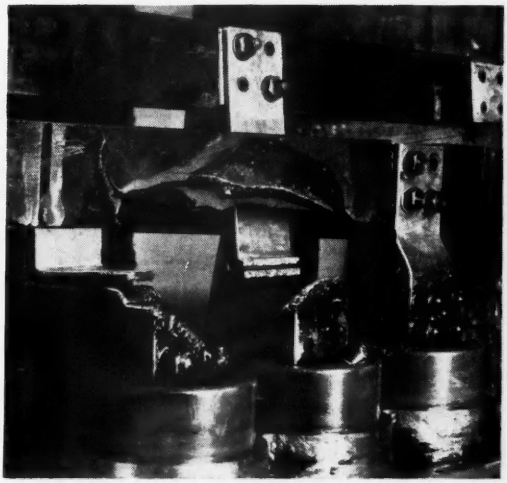
There were also 102 dangerous occurrences entailing the disuse of apparatus for defined periods through explosions or fires consequent on electrical faults. Brief analyses are presented of 81 typical cases of failure of apparatus with explosive violence and/or fire. An appendix lists the certificates issued by the Chief Inspector of Factories for electrical apparatus for use in specified atmospheres. A second appendix with 16 diagrams relates to high-frequency metallurgical furnaces and their electrical protection.

Among the subjects discussed in some detail is that of inadequate rupturing capacity of switchgear owing to growth of short-circuit MVA. Pending replacement, old circuit breakers have been protected by h.r.c. fuses or fault energy has been reduced by sectioning installations. Warning is given of the effect of wear on figure keys in allowing them to turn the wrong locks of switchgear cubicles.

Load shedding has intensified danger owing to the sudden plunging into darkness of running machines. Stand-by lighting should be arranged at staircases, exits and near such machines; no-volt releases must be in good condition; and it should be someone's duty to ensure that all isolating switches are opened immediately after a power cut. Voltage reduction, which tends to increase motor current, resulting in overheating of small machines, may cause fires. Moreover, it discourages the use of

* "Electrical Accidents and their Causes, 1950." Form 929. Factory Department, Ministry of Labour and National Service. Pp. 76; plates 4; figs. 16. H.M. Stationery Office, York House, Kingsway, London, W.C. 2., price 3s.

Result of flash-over between phases at busbar connections caused by cavitation of compound due to minor arcing



fluorescent lamps in view of flickering. There have been fewer cases of the fouling of overhead lines by jib cranes during constructional work; the chief difficulty is to get the lines deviated before the work starts.

Weaknesses in old installations are summarized as: defective earthing owing to loose conduit joints; deterioration in equipment, especially plugs and connectors for portable apparatus; interchangeable three-phase and single-phase plugs and sockets; and improvised extensions and absence of records leading to confusion regarding circuit loading, automatic protection and cable routes.

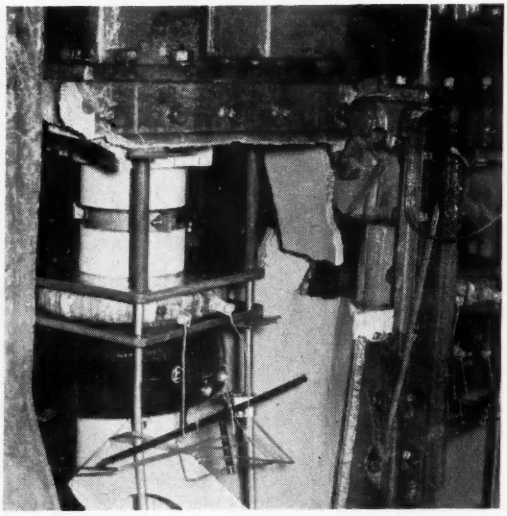
The chances of recovery from electric shock if resuscitation is begun within a minute are said to be as high as 95 per cent and, with effective ventilation and circulation, recovery after ten hours has been reported. Various methods in use abroad, including mechanical, are described. The conclusion is reached that a relatively imperfect means of artificial respiration applied immediately has a much higher prospect of success than a better one after delay.

In electrolytic plant the tendency is to raise the voltage, and d.c. at 850 V is being used abroad. In such cases an earth-free system is recommended. The safe use of electricity in gas works and in aircraft construction testing is also discussed. In the latter case the especial desirability is pointed out of transforming to 110 or 50 V, with the centre point of the transformer winding earthed, as is increasingly becoming the practice for portable electrical apparatus elsewhere including building work. The difficulty of maintaining conductivity in screwed conduit joints is discussed in relation to experiments carried out by the Electrical Research Association.

Failure to maintain push-button switches controlling shunt coil operating circuits resulted in several accidents. In one example, an operator lost his fingers when clearing an obstruction in his machine through its starting up due to moisture causing an earth fault in the shunt circuit, thus energizing the contactor coil. To prevent a recurrence isolating switches as well as stop buttons were fitted.

In inflammable surroundings or explosive atmospheres pressurization or "intrinsically safe" control circuits, working with remote relays, may be more suitable than flame-proof equipment. Regarding welding, to avoid danger from wandering return currents it is recommended that both welding return leads should be insulated, the "work" being earthed independently.

Explosion in compound-filled trunking due to three-phase fault in 6·6 kV conductors to potential transformers



In some supply substations the resistance at the neutral earthing point may be 50 ohms, which tends to nullify consumers' protective devices. Area Boards usually find it possible to reduce this value to 10 ohms without undue expense but a further reduction to 0·5 ohm permanently would be costly. It is suggested that the cost of differential or core-balance protection to smaller consumers may ultimately compare with that of trying to accommodate maximum fault currents.

An earth plate is not as good or as cheap a means of making effective electrical connection to soil as earth rods spaced 10 to 20ft apart, since it gives less wide distribution of current flow. The use of a buried strip electrode is similarly inferior,

except where underlying rock prevents the driving of rods to any depth. Earth-leakage recorders, which can detect incipient faults, have reduced risks of burnout of apparatus and fire; also they cannot function unless there is earth continuity.

A section of the report is devoted to electronic engineering with especial reference to its contributions to safety, ten of which are mentioned. In this connection the limitations of "failure to safety" methods are discussed. Another section relates to emphasis placed on electrical safety in lectures at the educational establishments set up by the British Electricity Authority and the North of Scotland Hydro-Electric Board.

Improving Productivity

Final Report of the Anglo-American Council

AFTER three and a half years' work the Anglo-American Council on Productivity held its last session in May and now the Council has published its final report, obtainable from 21, Tothill Street, London, S.W.1, price 3s 6d, including postage. This report reviews the history and pre-history of the Council.

At the outset five working centres were set up to deal with (*a*) plant visits and exchange of production techniques; (*b*) maintenance of productive plant and power; (*c*) productivity measurements; (*d*) standardization, specialization and simplification in industrial production; and (*e*) economic information.

Visits to the United States by 47 industry teams and 19 teams dealing with special subjects were arranged. The industries concerned in the first group included steel founding, drop forging, pressed metal, i.c. engines, electricity generation, transmission and distribution, electric motor control gear, brass foundry, non-ferrous metals, zinc and aluminium die-casting, iron and steel, steel construction and moulded plastics. The specialist teams included parties dealing with simplification, materials handling, packaging, welding, training of operatives, plant maintenance, and conservation of fuel and energy.

All told, 911 individuals (including 26 women) have thus been to the United States and 2,000 plants or places of business have been visited. Reports have been produced which have formed a storehouse of information on which thousands of firms in the United Kingdom are now drawing. Over 500,000 copies of these reports have been printed and distributed.

There have been reciprocal visits by teams from the United States which came to this country to study the cotton textile, pressed metal and electricity industries.

Steps have been taken by the Council to bring the information and recommendations in the team reports to the notice of all who can profit by them. It has been impossible to include in the report a list of the measures instituted in the different industries as a result, but in an appendix a summary is given of developments traceable to nine of the earliest reports.

Apart from the team visits much useful work has been done by the Council's committees in collecting and disseminating information on matters of general influence in improving productivity, e.g., simplification, standardization, and the maintenance of productive plant and power.

The cost of this programme of activities has amounted to about £844,500 of which the United Kingdom section (from Treasury grant and contributions by employers' and employees' organizations) and the industries concerned have provided £320,000; the United States section contributed about £524,100. In addition, the employers of the members of teams continued to pay their wages and salaries and in many cases supplemented the allowances given by the Economic Co-operation Administration. The American firms and others have also incurred much cost in providing hospitality.

Appendices to the report describe the organization of the United Kingdom and American staffs and procedure for organizing teams and visits. A typical team itinerary is given and there are notes on the preparation of the reports.

Electricity in Aircraft

Display of Equipment at Farnborough

THE flying display and exhibition of aeronautical equipment and instruments which is organized annually by the Society of British Aircraft Constructors (S.B.A.C.) was held at the Royal Aircraft Establishment, Farnborough, Hants, from 1st to 7th September. Apart from a most impressive series of demonstrations of the latest types of civil and military aircraft there was a comprehensive exhibition of aircraft engines, components and instruments. Amongst other things this display forcibly illustrated the rapidly increasing use and growing complexity of electrical apparatus in aircraft.

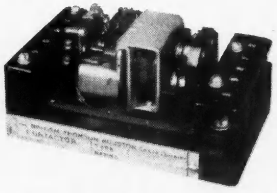
The attention of many aeronautical research workers is now directed toward the problems involved in the design of machines for flight at supersonic speeds and on the Ministry of Supply stand a number of items showed what is being done in this direction. For example, there was a demonstration of the current technique of measuring rates of heat transfer in rocket motors, a Mach meter calibrator, a recording accelerometer, and an electronic simulator for the solution of flutter problems.

The latest techniques of using liquid fuel propellants are incorporated in the turbo-starters for jet engines shown by the British Thomson-Houston Co., Ltd., and, in addition to aircraft magnetos, this company's exhibits included booster coils, high-energy ignition units, a.c. and d.c. motors and generators, actuators, switches, voltage regulators and lighting equipment. The increased use of higher d.c. voltages has introduced many problems in circuit interruption and control and the new range of 120 V contactors and circuit breakers which is now available is suitable for use at all altitudes. The circuit breakers have all been designed to rupture fault currents up to 8,000 A at 40,000ft.

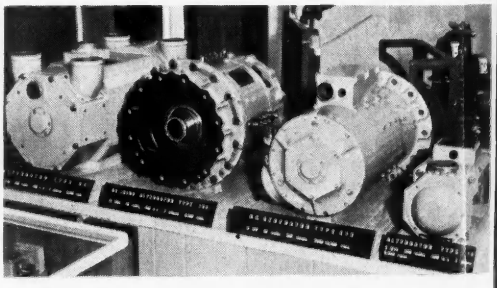
Motors, generators, rotary transformers and so on were shown by the Frigidaire Division of General Motors, Ltd. These "Delco" machines include totally enclosed and fan-ventilated flameproof types for short time and continuous rating, all achieving maximum output with minimum weight. Many variations of these basic designs are regularly manufactured to meet individual requirements.

Several interesting machines were also displayed by the English Electric Co., Ltd., including a 23 kVA, 40 V, three-phase, 400 c/s, 8,000 r.p.m. de-icing alternator and a 9 kW, 30 V, 300 A d.c. generator with the very wide speed range of 2,850 to 10,000 r.p.m. Apart from demonstrations of the company's "Canberra" jet bomber, other exhibits included a supersonic tunnel balance, equipment for measuring undercarriage wheel revolutions and apparatus for the automatic recording of flight measurements.

Gyroscopic gun sights were exhibited by Ferranti, Ltd., together with a series of



B.T.H. 10 A contactor for 120 V d.c. systems in aircraft



Typical English Electric alternators and d.c. generators for airborne installations

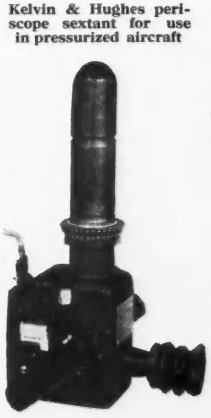
items illustrating the extent to which "miniaturization" is now carried out. There were injection moulded sub-assembly units which can easily be produced in quantity. The valves are mounted in Bakelite tubes which are part of the complete moulding and the various tag pins and other fixing points are also incorporated directly in the mould. The resulting framework is extremely rigid and there is a weight and space saving of about 50 per cent over more conventional units.

The exhibits of the General Electric Co., Ltd., included a new humidifying unit for providing a comfortable atmosphere in the pressurized cabins of air liners flying at high altitudes; a number of these have been supplied for use in " Bristol 175 " aircraft. Standard galley equipment was also shown, together with interior lighting fittings, a G.E.C. heavy alloy exhibit and two groups of Pirelli-General cable. Approach and runway lighting units were shown on the ground equipment side, including the latest type of elevated runway light, which is constructed in moulded " Perspex" and spun aluminium.

A representative display by Sangamo Weston, Ltd., included instruments for use with navigational systems, power indication and temperature and movement measurement. Other exhibits included ground test sets, relays, thermocouples, thermometer bulbs, oil pressure transmitters and position indicators.

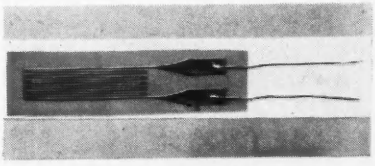
The equipment shown by Smiths Aircraft Instruments, Ltd., included an electric automatic pilot and electrical and air-driven artificial horizons, directional gyros, airspeed indicators and turn and slip indicators. Bryans Aeroquipment, Ltd., had on view a wide range of apparatus for testing and calibrating these types of instruments. In a comprehensive display of pilots' instruments Kelvin & Hughes (Aviation), Ltd., showed a portable electrically operated periscope sextant for use in pressurized aircraft.

Also in the field of measurement, Saunders-Roe, Ltd., demonstrated the foil strain gauge which it has produced in collaboration with Technograph Printed Circuits, Ltd. This device is a departure

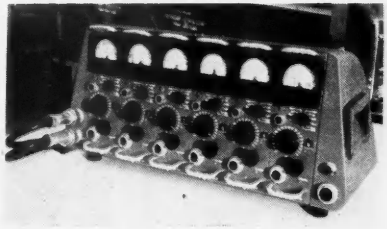


Kelvin & Hughes periscope sextant for use in pressurized aircraft

G.E.C. Elevated runway light



The recently developed Saunders-Roe-Technograph foil strain gauge



Left: **Ferranti injection moulded lightweight sub-assembly unit,** *Right:* **McMichael six-channel carrier type bridge amplifier**

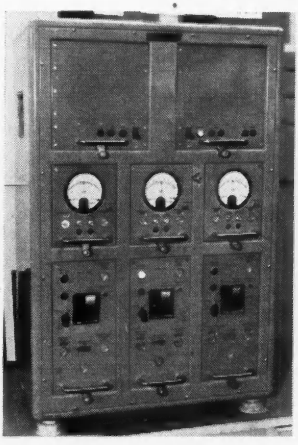
from the conventional wire construction and it is robust, easily mounted and waterproofed, takes up a negligible amount of space and costs very little to replace.

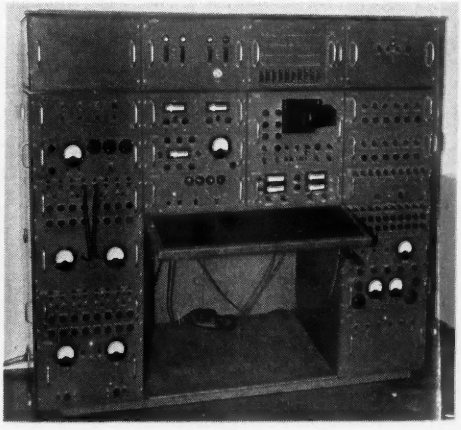
Among precision electronic research instruments for airborne and ground laboratory use McMichael Radio, Ltd., had a six-channel stable bridge amplifier operating on the carrier principle for use with strain gauges and accelerometers. Other items included aircraft radio-interference suppressors and an airborne torquemeter facilitating direct measurements of the torque transmitted by a rotating shaft without affecting the normal function of the engine under test. Equipment for the recording of strain for stress analysis and for the plotting of electrical signals was demonstrated by Savage & Parsons, Ltd.

Apart from magnetic amplifiers and relays, Elliott Brothers (London), Ltd., exhibited several instruments for flight and research applications. Of particular interest was a portable, mains or battery operated, manually balanced strain indicator and an automatic balancing three-channel strain gauge bridge suitable for many investigations including aerodynamic research in wind tunnels.

The comprehensive general purpose recording equipment demonstrated by Boulton & Paul Aircraft, Ltd., is for film and pen recording on a large number of channels with provision for visual monitoring and measurement of dynamic and static parameters. This instrument is used for investigational work on the operation of hydraulic and electro-mechanical power amplifying servos, hydraulic jacks, actuators and rams, motor driven linkages and gears, structural stiffness tests, impact and resonance tests and so on.

Standard Telephones portable microwave link





Elliott three-channel strain gauge bridge and (*right*) Boulton & Paul general purpose recording equipment

A very complete range of communications equipment for ground and airborne operation was displayed by the Plessey Co., Ltd., together with an extensive selection of wiring accessories, preformed wiring, plugs and sockets, actuators and motors. There was also a demonstration of the company's latest technique of making crimped solderless connections.

British Insulated Callender's Cables, Ltd., exhibited p.t.f.e. insulated winding wires and three types of 250 V cables including " Pren," " Glasil " and " Glasef " cables designed for operation at normal temperature, 150 deg C and 250 deg C respectively.

Communications equipment and radio aids to navigation were shown by a number of firms including Marconi's Wireless Telegraph Co., Ltd., E. K. Cole, Ltd., Cossor Radar, Ltd., Decca Navigator Co., Ltd., Burndept, Ltd., Murphy Radio, Ltd., Redifon, Ltd., and Ultra Electric, Ltd. Apart from a radio sonde and its ground station Salford Electrical Instruments, Ltd., exhibited selenium rectifiers, quartz crystal units and a wide range of measuring instruments. The rectifiers shown by the Westinghouse Brake & Signal Co., Ltd., included germanium, copper-oxide and selenium types and newly developed 70 deg C working blast cooled units. Also on view was the " Transbooster " constant voltage mobile d.c. power unit for servicing and engine starting.

Rectifiers were also shown by Standard Telephones & Cables, Ltd., alongside a wide range of communications and navigational equipment and a portable microwave link designed to accept a wide signal bandwidth from 25 c/s to 5·5 Mc/s. This equipment could be used for sending on radar signals, television outside broadcasts, or as a 24-channel telephone or a 24 times 24 channel telegraph link.

Comprehensive ranges of aircraft batteries of all types were shown by Chloride Batteries, Ltd., Oldham & Son, Ltd., and Peto & Radford, Ltd. Venner Accumulators, Ltd., had its ultra lightweight silver-zinc accumulators and Venner, Ltd., showed timing apparatus, navigational flashing units, emergency lighting panels and fire delay and jet starter switches.

"The Case for Electricity"

THE article on this subject by Dr. P. Dunsheath which appeared in the *Financial Times* of 27th and 28th August has provoked a number of responses. The first was a letter from Mr. E. M. Wagner who made much of load shedding and power cuts. Then Mr. F. G. Brewer, secretary of the Gas Council, stressed the value of the by-products of the gas industry and expressed the opinion that Dr. Dunsheath's articles were a case against any other form of fuel but electricity. He said that both gas and electricity had their " proper spheres."

There followed a letter from Mr. R. E. Gamlen who said that power shortage was entirely due to Governmental restrictions on plant extension during the war. He also challenged figures given by Mr. Brewer for gas-electric equivalents.

On the following day (4th September) an article by Mr. Oliver Lyle appeared in which the author tried to present " the balanced truth about electricity supply and demand." He contended that electricity must be generated more efficiently and its use instead of other equally or more efficient fuel must be discouraged. A letter in the same issue from Mr. R. Matthews, assistant secretary to the Coal Merchants' Federation of Great Britain, contested Dr. Dunsheath's statement regarding the waste of coal in transit from the mines to the ultimate consumer.

Replying to Mr. Brewer and Mr. Wagner, on 8th September, Dr. Dunsheath maintained that coal burned at gas works was among the highest in calorific value of any class of coal used. He refuted the suggestion that industrial consumers of electricity were subsidizing the domestic consumer. Power cuts in the year 1946–47 were, he pointed out, due to the emergency conditions arising from the shortage of coal, and he added that conditions to-day were much easier.

Last week we referred to comments in the *Observer* which deprecated the use of electricity for heating. In last Sunday's issue of the paper a letter appeared from Mr. A. S. Lowe, secretary of the B.E.A.M.A. Electricity Development Committee, in which he advocated freedom of choice for the housewife. He showed that there was no such disparity in the combined efficiency of production, distribution and use of electricity compared with other methods as to justify a change to gas, coke or coal for heating purposes.

Commerce and Industry

Television in Canada

New Zealand Import Concession

THE Canadian Broadcasting Corporation's first television network was officially opened on 6th September. The ceremony at Montreal was performed on Saturday, and at Toronto on Monday.

An order worth $300,000, was placed with Marconi's Wireless Telegraph Co., Ltd., by the C.B.C. through the Canadian Marconi Company in May, 1950, and in the following month a $180,000 order was received for two specially-designed outside television broadcasting vans.

Both cities have been equipped with two studios (one large and one small), control rooms, a master control room, and film-projector room.

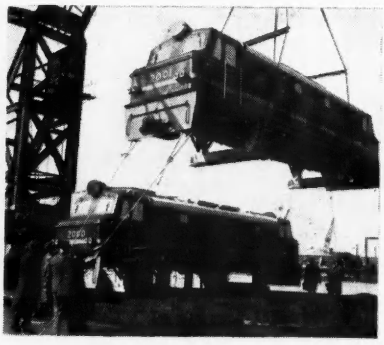
Vulcanized Rubber Compounds

The issue is announced of B.S. 1154 in replacement of the war emergency specification of 1944 which was based on the earlier Government Department T.G. 25A. The new document covers four white compounds of natural rubber and zinc oxide and six compounds of natural rubber, zinc oxide and lamp black. They are classified according to their hardness, the specification including skeleton compositions as well as testing requirements. Copies are obtainable from the British Standards Institution, 24, Victoria Street, S.W.1, price 2s 6d post free.

Electric Locos for Brazil

The first two of ten 1,072 h.p. 3,000 V d.c. electric locomotives made by the Metropolitan-Vickers Electrical Co., Ltd., for Rede de Viacao Parana-Santa Catarina, Brazil, have recently been shipped from Liverpool. They are 50-ton four-axle (Bo-Bo) locomotives for mixed traffic. The accompanying picture shows the locomotive bodies being loaded at the docks.

Metrovick locomotives being loaded at Liverpool Docks for shipment to Brazil



Belfast Exhibition

Electrical goods are well represented at the Ulster Ideal Home Exhibition, King's Hall, Balmoral, Belfast (27th August to 13th September). The display of Charles V. Hill, Ltd., on three stands, comprises lighting fittings, cookers, refrigerators, fires, toasters, irons and radio receivers of various makes. J. Oliver Leech, Ltd., are exhibiting a selection of commercial and domestic refrigerators and food preparing machines. Other firms exhibiting electrical goods are Keeling & Knox, Hoover, Ltd., Wilkins & Mitchell, Ltd., Easiwork, Ltd., and Millard Bros., Ltd.

N.Z. Import Licences

The *Board of Trade Journal* of 30th August states that information has been received from New Zealand that consideration will be given to the granting of licences on a token allocation basis for imports from the United Kingdom of a number of classes of goods. The list includes electric heating and cooking apparatus, domestic appliances and radio receiving sets.

The New Zealand Board of Trade has examined objections to the proposed exemption from import licensing of, *inter alia*, vacuum cleaners and electric ironing machines and has decided not to recommend decontrol until the appropriate tariff duties have been reviewed—probably not before next April.

New Motor Factory

Small Electric Motors, Ltd., has opened a new factory at St. John's Works, Green Lane, Penge, London, S.E.20, for the manufacture of electric motors. The new premises have an area of 16,000 sq ft and from 100 to 150 people are employed.

Pakistan Celebrations

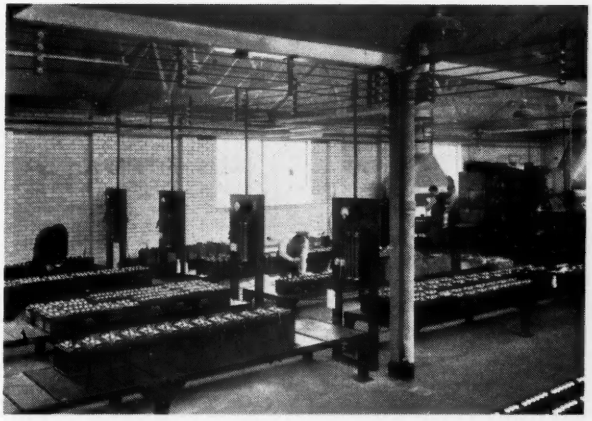
For Pakistan Independence Day on 14th August the electricity showroom of the Rawalpindi Electric Power Co., Ltd., was attractively decorated and illuminated. The moon and the five pointed star were very brilliant, the sign being worked by flashers for the moon gradually

Rawalpindi electricity showroom illuminated for the Pakistan Independence Day celebrations

to be flooded with light and the five-pointed star then to emerge in a burst of colour; the cycle of operation took about two minutes with "off" periods of 15 seconds.

New "Exide" Depot

The "Exide" and "Drydex" depot of Chloride Batteries, Ltd., at Bristol has been removed to new and spacious premises in Whitehouse Street on the city's Bedminster industrial estate. The depot, which serves the counties of Devon, Cornwall, Somerset, Gloucester, Wiltshire and Dorset, and the whole of South Wales, has an area of over 20,000 sq ft and is one of the best equipped in Great Britain. The new building is divided in half by a covered drive-way for road transport vehicles. An overhead travelling crane has been installed to handle the heavier loads. Apart from the offices at the front of the premises and the canteen and recreation room at the rear, the various departments of the depot are arranged on the ground floor. The charging department, with its ten modern charging racks, the repair shop, equipped with all the latest appliances for battery servicing, the charged battery and accessory stores and the trade counter are situated in the front. On the other side of the drive-way are the "Exide," "Drydex" and publicity material stores and the packing department. The move has enabled the depot to supply from stock "Exide-Ironclad" traction batteries, which until recently were dispatched direct from the company's headquarters at Clifton Junction, Manchester.



A section of the Charging Department at the new Chloride Batteries depot at Bristol

Success in Canada

Surveying British exports to Canada in *The Times* of 25th August that newspaper's special correspondent in Toronto said that in assessing the permanent prospects of British trade in Canada, it might be unwise to emphasize the amount of primary steel which Great Britain is exporting, since steel orders need no canvassing anywhere to-day. A truer reflection of British prospects is the gains that have been made in the sales of machinery, especially heavy electrical equipment and machine tools. The writer says:—"These improvements appear to be the result of close attention by British manufacturers to Canadian requirements. There has been a growing volume of orders for equipment like steam turbo-generators for power plants and for machine tools."

Furnace Works Tours

During the winter each year Wild-Barfield Electric Furnaces, Ltd., welcomes parties of up to thirty senior engineering students from technical colleges and research establishments to its Watford Works, where an interesting and extensive tour is arranged. The tour includes a visit to the production shops where electric furnaces from laboratory units to full-scale production furnaces and induction heating equipment can be seen in all stages of manufacture. The metallurgical and chemical laboratories provide ample opportunity for the study of research methods and equipment,

while the furnace development section affords the visitor scope for seeing many new heat-treatment processes and prototypes in the course of development. An invitation is extended to visitors from 1st September to 31st May, 1953 on any weekday afternoon (Monday to Friday).

Course for Plant Engineers

A refresher course on heat and power for senior works and plant engineers over a wide area surrounding Nottingham will be conducted in the Department of Civil and Mechanical Engineering, University of Nottingham, on Tuesday evenings for a period of 19 weeks commencing 28th October. The course has been organized by a committee, under the chairmanship of Mr. E. G. Phillips, O.B.E., M.I.Mech.E., M.I.E.E., which includes representatives of local industries and institutions in collaboration with the Regional Council for Further Education, the University of Nottingham and the East Midlands Kindred Engineering Societies. The principal subjects will be as follows: Fundamentals of heat and power; the internal combustion engine; the gas turbine; back pressure and pass-out turbines; the steam engine; fundamentals of heat transfer; grates and stokers; boilers, economizers and superheaters; distribution and economic use of process steam; instrumentation. The fee for the course will be £4 4s. The hon. secretary to the course is Dr. H. K. Lloyd, Department of Civil and Mechanical Engineering, University of Nottingham, University Park, Nottingham.

Lamp Publicity

The lamp advertising of Siemens Electric Lamps & Supplies, Ltd., for the coming lighting season will again, in its appeal to the public, stress the "black cat" theme and this will appear on buses in London and throughout the provinces and in provincial evening and weekly newspapers. "Point of sale" advertising will consist of new window display pieces, showcards and cut-outs for shop and counter display, and a model house for counter use in which lamps can be switched on at will. The window display pieces, while retaining the black cat, now subordinate it to a very attractive motif. New and comprehensive catalogues of the complete ranges of "Siemens" lamps and "Sieray" fluorescent lighting equipment are in preparation and a new industrial fittings list (No. 1013), has just been issued. Advertising of "Full o' Power" and "Siemax" batteries will be continued in provincial weekly newspapers throughout England, Scotland and Ireland. A new window display piece bearing the slogan "Have That Extra Punch" will be available for all retailers and will be augmented by showcards and cut-outs.

A new window display piece prepared by Siemens Electric Lamps & Supplies, Ltd.

Prices of Materials

In the accompanying table we give the prices of the more important materials used in the electrical industry. The figures are those quoted on Monday last.

ALUMINIUM Ingots	.. ..	ton £157 0s 0d
COPPER, H.C. Electro	.. ..	ton £285 0s 0d
Fire Refined 99·70 per cent	..	ton £282 10s 0d
Fire Refined 99·50 per cent	..	ton £274 0s 0d
COPPER Tubes	..	lb 2s 8¾d
Sheet	.. ..	ton £239 0s 0d
H.C. wire and strip	.. ..	ton £317 15s 0d
LEAD, English ..	.. ..	ton £132 10s 0d
Foreign	.. ..	ton £131 0s 0d
MERCURY	.. ..	flask £65 0s 0d
TIN	.. ..	ton £963 0s 0d
ZINC, G.O.B. Foreign	.. ..	ton £122 0s 0d
Electrolytic ..	.. ..	ton £126 0s 0d
BRASS Tubes ..	.. ..	lb 2s 3¼d
Sheet	.. ..	lb 2s 6d
Wire	.. ..	lb 2s 9d
PHOSPHOR BRONZE		
Wire	.. ..	lb 4s 1½d
RUBBER, No. 1 R.S.S. spot	..	lb. 22½d 22¾d

Cast Aluminium Alloy Data

In February this year Alar, Ltd., sent out copies of its revised cast aluminium alloy data sheets showing related specifications and trade names. In order to make the information contained on these sheets more accessible, the company has now prepared a condensed form mounted on the two sides of a board.

Indian Duty on Batteries

The Indian Government has accepted recommendations by the Tariff Commission that the protection of the Indian motor-car battery industry should be continued until 31st December, 1955, but that the standard rate of protective duty should be reduced to 42½ per cent *ad valorem*, exclusive of surcharge, for motor vehicle batteries and plates of British manufacture. The rate for non-British batteries and

plates will be fixed in accordance with the terms of the General Agreement on Tariffs and Trade.

The Commission also made a number of recommendations for the improvement of the Indian car battery industry.

Walsall Conduits New Premises

On 30th August, Walsall Conduits, Ltd., moved its Oxford branch to more spacious premises at Ferry Hinksey Road, Oxford. The opening ceremony was performed by Mrs. A. E. Millard, wife of the managing director, and a number of business friends and representatives from local concerns were then shown round. The manager of the branch is Mr. J. Bines.

A group at the opening of the new Oxford premises of Walsall Conduits, Ltd.

Power Station Visit

Electrical engineers from Belgium, accompanied by officials of the English Electric Co., Ltd., recently visited Westwood (Wigan) power station of the North Western Division of the British Electricity Authority. They were particularly interested in the switchgear and discussed the difficulty of localizing faults on ring mains.

Materials Handling

A 142-page treatise on "Materials Handling in Industry" is one of a series of eight dealing with various aspects of electricity as an aid to improved productivity published by the British Electrical Development Association. It is a comprehensive survey of the many handling aids, largely electrically operated, now available to industry. An introduction defines the term "materials handling" and sets out the benefits to be derived from the installation of handling equipment.

Next, attention is paid to the moral effect upon the workers of mechanical handling and the need for securing their co-operation is urged. Other relevant factors are also touched upon. The choice of equipment is then studied with reference to the factors influencing that choice.

The main body of the book is devoted to the different types of mechanical handling systems. These include overhead runways and lifting equipment; cranes, elevators and conveyors of various kinds; floor transport and storage; vibrating screens and conveyors; and miscellaneous equipment. Examples of systems actually installed, with notes on the benefits secured, are given in the final chapter.

The book is very well illustrated (there are 109 figures) and there is an adequate index. Copies can be obtained from the Association at 2, Savoy Hill, London, W.C.2, price 8s 6d, including postage.

Rist's Wires Jubilee

The fiftieth year of Rist's Wires & Cables, Ltd., is being celebrated this year and as a memento of the occasion the company has issued an illustrated booklet giving a brief history of its progress. As part of its jubilee celebrations, a concert was held at Victoria Hall, Hanley, on Thursday, at which Mr. B. L. Bisgood (chairman) opened the proceedings. The speakers were Mr. S. A. Davis (Midland Regional Controller, Ministry of Supply), Ald. G. L. Barber (Lord Mayor of Stoke-on-Trent), Councillor E. Bond (Mayor of Newcastle-under-Lyme), and Mr. D. A. V. Rist (managing director, Rist's Wires & Cables, Ltd.). During the concert, presentations were made to employees with over twenty-five years' service.

Educational

The Manchester and District Advisory Council has issued the prospectus of post-advanced lectures in electrical and mechanical engineering at the Royal Technical College, Salford, and the College of Technology, Manchester, during the 1952–53 session. Particulars can be obtained from the hon. secretary of the Council, Education Offices, Deansgate, Manchester, 3.

A course of six lectures on "Relaxation Treatment of Electrical Problems" will be given by Mr. G. F. Freeman at West Ham College of Technology on Thursday evenings

commencing on 16th October. The fee for the course is £1 1s and particulars can be obtained from the College, Romford Road, West Ham, E.15.

The prospectus (price 3d) is now available of the evening departments of the Portsmouth Municipal College for the 1952–53 session.

Trade Announcements

Mr. E. Edwards has been appointed representative of **Nettle Accessories, Ltd.**, and will cover the following areas :—Mid-Sussex Sub-Area, East Sussex and South West Kent Sub-Area and southern portion of the Kent Sub-Area of the South Eastern Electricity Board ; and Nos. 3 and 4 Sub-Areas of the Southern Electricity Board. Mr. Edwards resides in Brighton (telephone : Brighton 20115).

A branch has been opened by **Giles (Electrical Engineers), Ltd.**, of 1a, Southampton Row, London, W.C.1, at 14, Hanover Square, Leeds, 3, under the management of Mr. Q. A. Gosling.

G.E.C. Handbook

For the first time since 1935 the General Electric Co., Ltd., has produced a handbook dealing in a comprehensive way with its electrical installation material. The latter term is liberally interpreted for the scope of the handbook is widened to take in such equipment as water heaters, fans, electric lamps, instruments and motors. Very full details are given and in some cases installation instructions and other useful guidance is included.

The prices given in each section are those prevailing in the first quarter of last year, but it is intended to issue up-to-date price lists periodically commencing early in 1953.

At the end of the volume (which comprises nearly 800 pages) there are brief illustrated particulars of the many other sections of the company's production ranging from agricultural equipment to heavy steelworks plant.

For overseas circulation a special edition has been produced, with 190 extra pages, containing a good deal of technical information likely to be needed by overseas buyers.

Sales Management Examinations

The Incorporated Sales Managers' Association, 4, Holborn Place, London, W.C.1, has issued a revised syllabus and regulations of the examinations in sales management.

Electrician's Pocket Book

A number of new chapters are included in the 1953 edition of the " Practical Electrician's Pocket Book " (Odhams Press, Ltd., 6, Catherine Street, London, W.C.2, 550 pp., price 5s including postage). Among the subjects of these are switches and control circuits, time switches, power factor correction and lighting for the home. Other sections have been extensively revised or re-written.

Trading in Lead

An announcement was made this week by the Board of Trade on the arrangements for the importation and exportation of lead when free trading on the London Metal Exchange is resumed on 1st October. Normally lead will be dealt with by members of the Exchange, but open individual import licences will be granted to large regular buyers. Other importers must apply for licences for each separate transaction to the Import Licensing Branch of the Board of Trade, Romney House, Tufton Street, London, S.W.1.

Catalogues and Lists

Telegraph Construction & Maintenance Co., Ltd., Telcon Works, Greenwich, London, S.E.10.—Four illustrated folders dealing with : PVC/B.1 cables of various sorts insulated and sheathed with p.v.c. and flexible cord ; MC/1 multicore aircraft cables ; HM/1 helical membrane radio-frequency cables ; YG/1 double screened and non-microphonic cables, which for customers' convenience are now issued as separate differently coloured folders.

H. H. Stark, Ltd., 193, Whitechapel Road, London, E.1.—An illustrated catalogue of trucks, ladders, etc., of many types.

British Insulated Callender's Construction Co., Ltd., 21, Bloomsbury Street, London, W.C.1.—A folder giving an illustrated description of the 750ft aerial mast erected at the Wenvoe television station.

Alliance Wholesale, Ltd., 24-30, Gillingham Street, London, S.W.1.—Catalogue 496 (86 pp.) containing illustrated particulars of a wide range of portable electric tools, with separate price list.

Watson & Sons (Electro-Medical), Ltd., East Lane, North Wembley, Middlesex.—Publication No. 316 dealing with the " Watson " radiographic camera unit.

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 3rd October.

WELEC. No. 705,600, Class 9. Insulated electric cables, electricity conductors, conduits, conduit fittings, distribution boards, fuse wire, electric kitchen utensils included in Class 9, instruments and apparatus for measuring electricity, electric soldering irons, switches, television apparatus and electric vacuum cleaners.—Frank Westerman (Wholesale), Ltd., 94, Dale End, Birmingham, 4.

NORMAN (design). No. 707,298, Class 9. Resistances, fuses, transformers, chokes and scanning coils, all being electrical apparatus.—Norman Rose (Electrical), Ltd., 5, Hampstead Road, London, N.W.1.

ALUPLAS (design). No. 707,665, Class 9. Insulated electric wires and electric cables.—Sterling Cable Co., Ltd., Sterling Works, Aldermaston, Berks.

Trades Union Congress

Further Discussions at Margate

From a Correspondent

BY overwhelming majorities, the Trades Union Congress meeting at Margate last week rejected two motions and an amendment on rearmament and the national economy and rearmament and peace and endorsed the General Council's statement on rearmament.

A composite motion was carried which condemned the White Paper on Transport Policy and the Transport Bill, asserted that the proposals were based on class interests and were against the finding of Royal Commissions and investigation committees set up by previous Conservative Governments. The motion also declared that no consultation had taken place before publication of the White Paper with the British Transport Commission as to the effect of the proposals.

Effect of Dear-Money Policy

Speaking to a paragraph in the General Council's report on capital investment in electricity supply, Mr. F. Foulkes (Electrical Trades Union) said that as a result of the dear-money policy, there was a tendency to retard capital development. The increase in interest rates had added £1,250,000 to the annual interest charges of the B.E.A., or about £25 per year per manual worker. He urged the General Council to take up the question of the dear-money policy with the Government.

A motion moved by the Engineer Surveyors' Association asked the General Council to approach the Government with a view to the introduction of a Bill for the certification of all persons in charge of the operation or maintenance of power plant. Opposed by the National Union of Mineworkers and other unions concerned, the motion was defeated.

Socialization in Industry

A composite motion on social ownership was adopted against the advice of the General Council. It denounced the Government's policy of denationalization, declared the support of the unions directly concerned to resist the policy, and welcomed the Labour Party's statement that it would extend social ownership. It also called upon the General Council to formulate proposals for the extension of social ownership to other industries and services, particularly those subject to monopoly control, and to submit the proposals to the 1953 Congress.

Wages and National Economy

The big debate on wages revealed a seriousness in the minds of some delegates that can be explained by the deepening crisis in the more vulnerable sections of British industry. For example, Mr. W. L. Heywood (Dyers, Bleachers and Textile Workers) pointed out that the fundamental problem raised by the report of the General Council was whether unrestrained wage claims were compatible with full employment. The report asked delegates to readjust their thinking to the new conditions.

Two motions were before Congress. The first, moved by the Union of Shop, Distributive and Allied Workers, seconded by the National Union of General and Municipal Workers, and supported by the Union of Post Office Workers, National Union of Tailors and Garment Workers, Post Office Engineering Union and the Civil Service Clerical Association, asked Congress to record " its determined opposition to the present Government's economic policy." It wanted wage increases to compensate for the reduction in food subsidies, the abolition of utility schemes, the effects of the increase in the bank rate, and the general rise in the cost of living.

Before the motion was put to Congress, Mr. Lincoln Evans, for the General Council, argued that so great had trade union influence and authority become that the whole question of the economic future of trades unionism depended on how the movement acted. The problem before Congress was to maintain economic stability in the situation in which the country's

resources were stretched to the limit and the balance of payments left no margin of reserve.

The second motion, moved by Mr. W. C. Stevens (Electrical Trades Union), noted with concern the continued rise in the cost of living and deplored a Government policy which had accentuated the tendency for prices to rise. It declared that the responsibility of the trade union movement was to safeguard and improve the wages and living standards of the workers, and rejected the Government's policy of "restraint" or "moderation" designed to secure the withholding of wage claims.

The General Council viewed this motion as being in conflict with its report and the first motion, which it supported.

Supporting the second resolution, Mr. T. Hill (Boilermakers) said it was immoral for the General Council to submit its report and say to the union executives: "You can still pursue a claim for 30s"—a pointed thrust at the National Union of Mineworkers who were supporting the General Council.

Mr. Stevens, moving the second composite motion rejecting wage restraint, said between 1946 and the end of 1951 wages had increased by 29 per cent, prices by 34 per cent, production by 43 per cent and profits by 100 per cent. This could not be regarded as a policy of fair shares. He argued that the General Council's report had presented the affiliated unions with a problem of interpretation. What, he asked, was a moderate amount and who exactly were the lower paid workers?

The first composite motion was carried and the motion of the Electrical Trades Union was rejected. The General Council's report was also approved.

On Friday last a motion on East–West trade was debated. It was framed in wide terms and asserted that extensive trading relations with China, the U.S.S.R. and other Eastern countries would make a substantial contribution towards improving the present international situation.

The new chairman of Congress is Mr. Tom O'Brien, general secretary of the National Association of Theatrical and Kine Employees and Socialist M.P. for Nottingham.

E.A.W. ACTIVITIES

TWO new E.A.W. branches have been formed, one in Scotland at Galashiels and one at Burton-on-Trent. The inaugural meeting at Galashiels was held under the chairmanship of Mrs. T. Smith, and the Provost's wife was present, together with members from Hawick E.A.W. Branch with their chairman, Mrs. A. H. Hendry. Speakers were Mr. J. M. Urquhart, Director of Education for Selkirkshire; Mr. G. H. Sankey, Sub-Area manager, S.E. Scotland Electricity Board; and Mrs. J. Falconer, E.A.W. organizer for Scotland. The chairman of Galashiels Branch is Mrs. Beattie, and the hon. secretary, Miss McNicoll.

At the formation of the Burton and District Branch, in the Electricity Service Centre, the Mayor gave a civic welcome and speakers included Dame Caroline Haslett, Director of the E.A.W.; Mr. C. R. King, chairman of the East Midlands Electricity Board; Mr. F. Overstall, district manager, E.M.E.B., and Mrs. Overstall. Mrs. A. Chadwick is chairman and Mrs. L. I. Bonner, hon. secretary of the branch.

The third E.A.W. examination for electrical sales assistants was held on 27th May last, when twenty-three candidates qualified for the certificate, three gaining distinction. The total number of certificate holders is now 98.

The certificate examination in electrical housecraft for demonstrators and saleswomen was held on 19th June, last, 109 candidates qualifying for the certificate, and five gaining distinction. The total number of certificate holders is now 1,849.

The certificate examination for teachers was held on 21st June when thirty-six candidates qualified for the certificate. The total number of certificate holders is now 1,737.

Quebec Power Projects

ONE generating unit of the 250,000 h.p. Peribonca No. 1 power plant at Chute du Diable, Quebec, was given a trial run on 13th August. Owned by the Aluminum Company of Canada, the plant is made up of five generating units which will begin operating at three-week intervals. It is expected that 500,000 tons of aluminium ingots will be produced in the region next year, the power from Peribonca No. 1 going to a new 50,000 ton smelter at nearby Ile Maligne. Another power plant, Peribonca No. 2, is under construction at Chute a la Savane, about 14 miles down the river, and is expected to be in operation early next year. Peribonca No. 1 was started in November, 1950, and its sister project the following spring.

Engineering in Europe

Survey of Current Literature

FREQUENCY regulation and power distribution are closely interrelated and any regulation method has to take into account these two factors; also the constancy standard of the frequency itself has to be decided according to actual requirements and possibilities in every individual system (industrial consumers are stricter in this respect than domestic consumers). The case of a system relying on a single power station has become relatively rare, but it is still suitable for studying the basic facts of the problem (this is the way chosen by the author) before entering upon a discussion of the more general case of interconnected systems. Even in a single power station the sharing of the load at any moment between the individual generators has to be regulated, if the frequency must be kept constant.

The two possible principles are: operation with a pilot machine and dependent generators, the latter being fitted with differential power regulators and the former with a frequency regulator; or simultaneous frequency regulation for all the machines with load distribution control. The latter method is preferable, because of the unbalance phenomena occurring with a pilot machine owing to the time lag between its own regulation process and those of the dependent machines.—" Regulation of the Frequency and the Power Exchange in Interconnected Systems," F. Cahen, *Electro-Techniek*, Vol. 30, No. 11, pp. 187–190, 22nd May, 1952, in French.

Belted Cables

The aging of belted power cables is mainly due to the formation of cavities under tangential stresses, polymerization in the gussets and creep discharges between insulation and serving; the latter may also lead to puncturing of the insulation. Experiments have shown that it is possible to keep aging cables in operation by providing them with a protective nitrogen gas filling, but this remedy can only be applied if there are actually cavities in the cable, whereas the insulation and sheath must be gasproof, at least by sections, as well as joints and terminal boxes.

The pressure of the gas filling need not, and should not, be higher than 1 atm. excess pressure; the gas should be filled in at the disconnecting boxes while the terminal boxes are, as always, filled with compound. Extension of the service life of aged cables can so be obtained at a cost not exceeding about 10 per cent of the cost of the replacement of the cables.—" Extension of the Service Life of Aging Belted Cables," W. Uderstadt, *Elektrotechnik*, Vol. 6, No. 4, pp. 165–169, April, 1952, in German.

Design of Large Transformers

The type of transformer to choose for a given rating and given operating conditions cannot be decided before starting on its actual design, but only at a later stage, because even a comparison of the copper and iron weights and of the losses of core and shell types of a required size of transformer is only possible by working out rough designs of both types. In doing this, however, interesting relations may be derived and put into relatively simple algebraical form. This process is demonstrated by the author step by step, starting with the magnetic circuits and proceeding to the windings, where considerations of insulation and cooling make the process more laborious than in the layout of the iron parts. The main part of the considerations is of a purely geometrical character, and electric and magnetic characteristics remain always in the background, or figure only in the intermediate calculations, the main results always appearing as volumes and linear dimensions.

The author carries out his comparison for single-phase and three-phase units and shows that in both cases the core-type with concentric windings is superior to the

Readers who require accurate full translations of any of the articles abstracted in this section can be put into touch with the translators who will supply them at current rates.—Editors, *Electrical Review*.

shell-type with alternating windings, except for single-phase h.v. transformers where the windings may be placed on a single limb and the unit can be transported without dismantling; the solution will then be a shell-type transformer with concentric windings. An example proves that a single-phase shell-type transformer for 20 MVA $\frac{220}{\sqrt{3}}$/15 kV will, for equal losses, be 8 per cent heavier, but 4 per cent cheaper than the corresponding core-type transformer.—" Considerations on the Design and Dimensioning of Large Power Transformers," A. Pichon, *Bull. Soc. Franc. des Electriciens*, 7th Series, Vol. 2, No. 14, pp. 69–80, February, 1952, in French.

Line Tower Foundations

An introductory outline is given of the development of soil mechanics, beginning with the classical investigations of Poncelet, Rankine and others and leading to the modern theory of Terzaghi, to which Prandtl, Jaukowski and Atterberg made valuable contributions. A section is devoted to soil testing methods and the evaluation of the results of soil tests; there follow descriptions of the types of foundations actually used: massive concrete foundations, steel anchors with grillages and tubular piles. The most important section is the description and critical comparison of the various means of calculating foundations, starting with the French official " grid " and Fröhlich's methods, passing to Sulzberger's and Burklin's, and ending with the Vierendel and the Belgian methods. The results for the moment of resistance of a standard foundation determined by all these methods are graphed and critically compared. The rest of the article is one long summary of all the more important tests ever made on foundations up to 1950.—" Foundations of V.H.V. Line Towers," P. Fayoux, *Bulletin Soc. Francaise des Electriciens*, 7th Series, Vol. 2, pp. 140–164, March, 1952, in French.

Oil Switch Explosions

Circuit breaker explosions may be of various forms and may be produced in various ways, although the basic facts remain essentially the same. They mostly occur in obsolete types of breaker, the arc-quenching period of which is about 0·1 sec and more, as against 0·02 sec of modern switches; also, internal insulation is mostly kraft paper and the contacts are not deep enough below the oil level. Occasionally a tank may be burst by the mere volume expansion of the gas bubble on clearing a heavy short-circuit, after expulsion of the air cushion through the vents; but more often explosions occur by the ignition of the gas-air mixture inside the tank (sometimes by purely thermal ignition) or in the circuit breaker compartment outside the tank.

If quick replacement of old breakers is impossible, an elementary safety precaution is the separation of such dangerous equipment from the rest of the substation installation by cubicle construction or by placing them in underground chambers. Fires, once started, spread easily in a substation and even dense oil smoke is highly dangerous in such places because it may make the whole substation uncontrollable and thus unserviceable.—" Explosions of Oil Circuit Breakers," F. Weickert, *Elektrotechnik*, Vol. 6, No. 4, pp. 178–181, April, 1952, in German.

Permanent Magnet Design

The design of apparatus using permanent magnets has been rendered easier by the availability of high-grade magnetic materials, but it has also been complicated by the widely varying mechanical and technological characteristics of those materials so that the correct selection of the most appropriate is in the last resort an economic question. A material of good machinability and high coercive force may be used for nearly every purpose economically, because often space saving is hardly less important than material saving.

Magnets consisting of such highly coercive alloys as alni, alnico, ticonal, permanite, etc., can thus be cheaper than those made of the old materials, despite the much higher price of the new materials, weight for weight. The author discusses the principles of design of loudspeaker, microphone and instrument magnets, based on hysteresis and energy curves, and the tests required. He gives the complete set of formulæ to be used (including those for the correction of the test results) and some useful tables for the selection of the most appropriate material.—" Modern Permanent Magnets and their Uses," F. Latscher, *E. und M.*, Vol. 69, No. 9, pp. 188–192, 15th April, 1952, in German.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Translucent Lighting Fittings

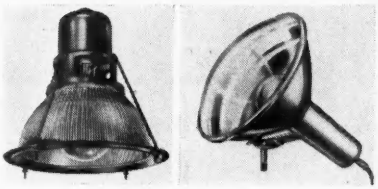
A SERIES of industrial translucent lighting units embodying prismatic reflectors has been brought out by HOLOPHANE, LTD., Elverton Street, Vincent Square, London, S.W.1, for use in lofty interiors where it is desired to provide, by light control, a satisfactory degree of ceiling brightness without reducing the illumination on the working plane.

The fittings are made in both single and twin units, the former being designed for tungsten lamps, while the latter employ both a mercury discharge and a filament lamp which together provide a colour blending approaching that of daylight. They embody heavy duty glass reflectors having internally reflecting prisms and are made in three types: extensive, intensive and focusing. The metal parts are of heavy gauge steel, protected against rust, and are finished in battleship grey or aluminium.

Coronation Floodlight

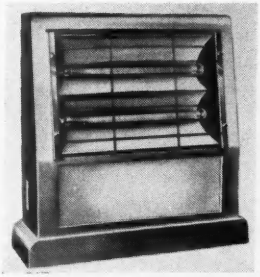
Organizers of both large and small Coronation celebrations will no doubt be interested in the "Fiesta-Flood" which is being made by the SIMPLEX ELECTRIC CO., LTD., Broadwell, Oldbury, Birmingham. This floodlight, which costs only 82s 6d, can accommodate and bring into nominal focus 300 to 500 W general service lamps, 500 W Class B2 projector lamps or 250 W MBT/V blended lamps. The general service and blended lamps produce a beam spread of 20 to 40 deg, while the others provide a narrow beam of 15 to 20 deg. Constructed of "Silvex" finished aluminium with highly specular internal reflecting surfaces, the fitting is thoroughly weatherproof and the convex heat resisting glass is sealed to the body by a rubber gasket. This floodlight is supplied complete with a rubber cable spout and 2ft of three-core t.r.s. cable and provides for maximum flexibility for mounting with a ¾in male thread conduit stem. Coloured glass covers can also be supplied at an extra cost of 6s each.

Left: **Holophane industrial translucent lighting fitting.** *Right:* **Simplex "Fiesta-Flood" floodlight**



Radiator and Panel Fire

The appearance of a new radiator (No. 612) produced by BERRY'S ELECTRIC, LTD., Touchbutton House, Newman Street, London, W.1, is enhanced by an illuminated glass panel beneath the heating elements. There are two of these elements (1 kW each) set in polished non-rusting reflectors. The frame has a warm silver finish and the two switches are recessed in the body. Dimensions are: width 17½in, height 18in and depth 5¾in. The price is £6 7s 6d (plus £4 13s 9d purchase tax in the United Kingdom).



Berry's No. 612 radiator

Another recent Berry product is the No. 606 2 kW panel fire. This measures 19½in wide by 12in high by 4½in deep. It has two control switches and is finished in stoved cream enamel. The fire costs £5 10s (plus £4 0s 10d purchase tax).

Dry Batteries

Seven new all-dry low voltage batteries in attractive new-style cartons have been introduced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, into its "Blue Label" range of radio dry batteries. At the same time two new layer batteries have been added to the "Red Label" range. All of these batteries are designed for the latest battery portable and combined mains-battery operated receivers.

The range of lighting batteries manufactured by the G.E.C. has been augmented by the introduction of the BA6120 6 V lantern battery, which can be used not only for portable lanterns but also to operate miniature electric motors in models, toys (such as electric train sets) and other devices demanding a compact, heavy duty battery.

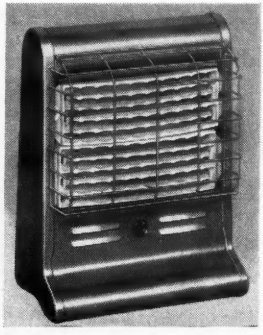
Copper-Clad Aluminium

A good way to extend the available supply of copper is to use "Cupal," a material which has recently been made available in this country by NORTH WESTERN METAL PRODUCTS, LTD., Viaduct Works, Cavendish Street, Ashton-under-Lyne, Lancs. This material has been produced in Germany for more than 15 years and consists of a covering skin of electrolytic copper on pure aluminium, both metals being amalgamated in such a way as to become inseparable.

"Cupal" is available in sheets, circles, strips, etc., with the copper skin on one or both sides, in thicknesses from 0·01 mm to 8 mm in various qualities. Obviously a material of this kind can be used for busbars and it has many applications in all kinds of electrical apparatus.

Safety Electric Fires

All models in the range of electric fires made by BRITISH NATIONAL ELECTRICS, LTD., Newarthill, Motherwell, Lanarkshire, Scotland, are now fitted with safety guards complying with

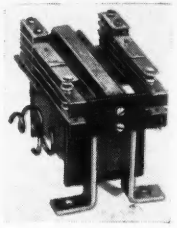


B.N.E. F.102 fire with guard

B.S. 1670 : 51. The current prices of the fires (including purchase tax), complete with guard and a 6ft length of flexible cord are : Models F.101, £3 9s 6d; F.102, £4 19s 9d; F.43, £9 11s; and F.103, £9 19s 6d.

Universal Multi-Contact Relay

An industrial relay with operating coil voltages from a fraction of a volt up to 550 V 40–60 c/s a.c. or 450 V d.c. has just been made available by the ELECTRICAL REMOTE CONTROL CO., LTD., Evanston Avenue, Highams Park, London, E.4. This type UNIV "Elremco" relay is supplied with up to 15 sets of contacts with any desired arrangement of normally open, normally closed or changeover contacts.



"Elremco" universal multi-contact relay

Silver is used as the standard material for the contact tips, the diameter of which is between $\frac{1}{16}$in and $\frac{3}{32}$in, but tungsten-elkonite or platinum contacts can be supplied: every pair of contacts can have a switching capacity between 0·5 A and 6 A at 230 V a.c.

NEXT WEEK'S EVENTS

Monday, 15th September

BIRMINGHAM.—Midland Hotel, 5.30 p.m. Birmingham Electric Club. President's evening.

LONDON.—Prince of Wales Hotel, Kingsbury, 7.30 p.m. Association of Supervising Electrical Engineers, North West London Branch. "Electronically Controlled Driving Equipment," by F. Ralph.

Tuesday, 16th September

EDINBURGH.—25, Charlotte Square, 7 p.m. Incorporated Plant Engineers, Edinburgh Branch. "Heat Transfer from Steam," by R. A. Brecknell.

GLASGOW.—Engineering Centre, 351, Sauchiehall Street, 7 p.m. Incorporated Plant Engineers, Glasgow Branch. "Mechanical Handling Equipment and Methods," F. T. Dean.

LONDON.—85, Minories, E.C.3., 5.30 p.m. Institute of Marine Engineers. Presidential address, by Lord Howard de Walden.

ST. ALBANS.—Peahen Hotel, 7.30 p.m. Incorporated Plant Engineers, St. Albans Branch. "Radio and Television Interference," by C. E. Hollingworth.

Tuesday, 16th September—Friday, 19th September

HARROGATE.—The Royal Hall. Association of Public Lighting Engineers. Annual Conference and Exhibition.

Wednesday, 17th September

BRISTOL.—Grand Hotel, 7.15 p.m. Incorporated Plant Engineers, Bristol Branch. "Energy from the Atom," by A. F. Possnett.

COVENTRY.—Technical College, 7.15 p.m. Association of Supervising Electrical Engineers, Coventry Branch. "Ductube," by a representative of the Ductube Co., Ltd.

MANCHESTER.—Engineers Club, Albert Square, 7.30 p.m. Association of Supervising Electrical Engineers, Manchester Branch. "Wire Ropes," film.

ROCHESTER.—Bull Hotel, 7.0 p.m. Incorporated Plant Engineers, Kent Branch. "Earths and Protective Earthing of Electrical Plant," by W. J. Jones

WIMBLEDON.—Guild House, 32, Worple Road, 8.15 p.m. Association of Supervising Electrical Engineers, South West London Branch. "M.I.C.C. Lighting, Power, Heating and Thermocouple Cables," by G. E. D. Redman.

Wednesday, 17th September—Saturday, 4th October

LONDON.—Olympia, International Machine Tool Exhibition.

ELECTRICITY SUPPLY

Colliery Power Schemes

Hydrogen-Cooled Plant for Uskmouth

THE South West Scotland Electricity Board has approved schemes to provide an electricity supply to Northfield Colliery, Shotts, at an estimated cost of £37,804; Whitehill Colliery, Cumnock, £10,543; and Killoch Colliery, Cumnock, £9,336.

All-Electric Houses

The 36 houses in the eighth development of Cliffburn Road scheme, Arbroath, will be all-electric homes. This decision has been reached by the Corporation Finance Committee. The housing architect reported that the installation of electric cookers and wash boilers in preference to gas appliances would mean a saving of £19 13s 4d on each house.

Efforts to Expedite Supply

The people of Stoke Bliss, Worcestershire, were told last week that their two-year-old fight to get electricity had failed. The Midlands Electricity Board plans to supply the village in 1956 and an admission of " absolute failure " to get the date brought forward was made in a letter last week-end by Mr. G. Nabarro, M.P. for Kidderminster. He told the chairman of the Parish Council that only Parliamentary reform giving the House of Commons more control over the Board could give Stoke Bliss electricity before 1956. " I have absolutely failed," said Mr. Nabarro, " and so has the Minister of Housing and Local Government and the Minister of Fuel, to prevail upon the Midlands Electricity Board to vary their decision, notwithstanding the powerful support of the National Farmers' Union and others." Some time ago the M.E.B. stated that there could be no power till 1956 unless the farmers could meet an annual guarantee of £1,131. Alderman Walter Lewis, chairman of the Board, pointed out that 8,820 yd of high and low voltage line, 12 transformer substations and £5,600 worth of services and meters would be needed for the supply.

Argentine Power Plant

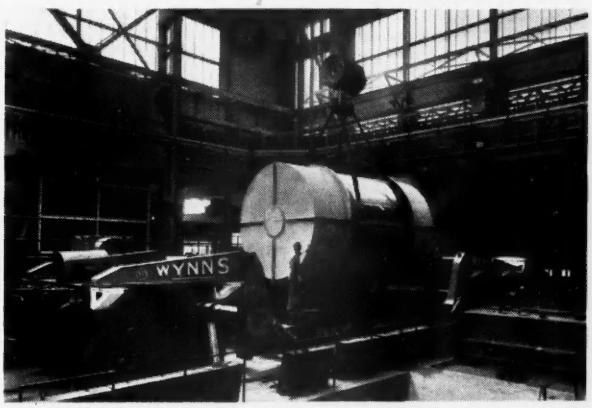
In reviewing figures issued by the Argentine National Statistical Service, the *Monthly Journal* of the British Chamber of Commerce in the Argentine Republic says that the renewal and replacement of power-house equipment in Argentina has not received the attention it deserves with the result that it has been found necessary to restrict private electricity consumption and street lighting and enforce a system of load " staggering " upon industrialists.

In May last, however, the Ministry of Industry and Commerce was authorized to invest the sum of 40 million pesos " for the completion of the erection of power equipment." The sums advanced will be repaid by the companies upon conditions established by the Ministry.

Hydrogen-Cooled Plant

The first of six 60 MW 11·8 kV G.E.C. hydrogen-cooled alternators for the new Uskmouth power station near Newport, Mon.

The stator of the 60 MW hydrogen-cooled alternator leaving the G.E.C. Witton Works for the Uskmouth power station



(B.E.A. South Wales Division), is now being erected on site. The stator of this machine, which weighs nearly 100 tons, is shown in the accompanying picture being loaded on to the trailer before leaving the Heavy Engineering Works of the General Electric Co., Ltd., at Witton, Birmingham, on 1st September. Orders are now in hand for fifteen machines of this type and rating as well as for seventeen 30 MW sets for this country and the Dominions.

Nottingham Extension

The British Electricity Authority has received the consent of the Minister of Fuel and Power to the extension of the Nottingham power station by the installation of a 60 MW turbo-generator set and two boilers each having an evaporative capacity of 300,000 lb/hr. The present installed capacity of the Nottingham station is 254 MW.

Cost of Supply to Farm

Northumberland County Council has received an offer from the North-Eastern Electricity Board to supply electricity to Windmill Farm at a cost of £1,730. The Council contends that this sum is excessive especially as the electricity cables pass close to the farm. The Council added that the tenants of the farm would not accept the terms, and the electricity Board has been asked to make a " substantial reduction " in the estimate.

Lines over School Property

Cumberland County Council has discussed with the North Western Electricity Board the question of supplying electricity to Irthing Valley School. The Council, however, is not in favour of the Board's plans for the erection of high-voltage lines over the school property and it is suggested that these should be placed underground. The Board states that the Council would be expected to pay the extra cost.

Freedom from Load Spreading

The Dundee and District Committee of the Scottish Board for Industry has announced that industrial and commercial consumers in the Dundee, Angus and Perthshire areas will not be required to submit schemes for electricity load reduction this winter.

South Wales Rural Supplies

A call for capital charges in rural districts to be reconsidered in view of the importance of food production, and for terms to be made easier for those having the greatest need, was made at a meeting of the South Wales Electricity Consultative Council in Cardiff last week. The Council was told that the Area Board's scheme included provision for deferred payment of the capital charge if so desired by the consumer. It was decided to ask the Board to charge interest at only ½ per cent above the rate paid by the Board on loans.

Mr. Kinsey Morgan, Rhayader, gave an instance of a farmer living some 650 yd from the supply who would have to pay more than £300 and expressed the view that in such cases it would be advisable for small farmers and other rural consumers to combine so as to reduce the capital charge per head. Alderman A. E. Gough, Cardiff, who presided, said the National Farmers' Union was in the process of grouping farms for this purpose.

Mr. S. O. Thomas, Trelech, Carmarthen, recommended that the Board should give rural consumers the choice of paying a fixed minimum annual rate or the capital charge. This suggestion was defeated, the Council accepting the Board's proposals on the calculation of capital contributions for the provision of mains and services.

At a previous Council meeting members felt it desirable to compare the total allocations of capital for rural supplies agreed upon by other Area Boards. The South Wales Board could not supply this information and the Central Authority, on being approached, had refused to give it on the grounds that it was supplied in confidence by the Boards. The meeting decided to write the Ministry of Fuel and Power for the figures.

Japanese Power Bill

The House of Councillors—the Japanese Upper House—has passed a Bill for the development of the country's power resources which has aroused much controversy. The Bill, with amendments, will still have to be referred to the Lower House. Criticisms have been centred on the Government-sponsored power development formula and no compromise has been reached between the promoters and opponents. The Bill proposes the exploitation of such rivers as the Tadami, Kitakami, Kuma, etc., but the Government is understood to be aiming also at the exploitation of other rivers like the Tenryu, Kumano, Yoshino, etc., where existing power companies are proposing to put up their own generating plants. The Bill calls for establishment of a corporation to carry out the construction projects. It is not clear whether the corporation will engage in selling the generated power. When the Bill was first placed before the Diet it was generally understood that the corporation would devote itself to the development of power resources, and that selling would be undertaken when it did not conflict with the primary objective. Opponents of the Bill have pressed for the establishment of regional power development companies as private interests.

New Turkish Station

The new hydro-electric station at Catalagzi in north-western Turkey was tested in August and is scheduled to enter into regular operation this month. The power will be distributed through substations at Eregli, Izmit and Istanbul.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

Reports and Dividends

Metal Industries, Ltd., held its annual meeting on 4th September, Mr. R. W. McCrone (chairman) presiding. Referring to the progress of the electrical division of the group, the chairman said that Brookhirst Switchgear, Ltd., and the Igranic Electric Co., Ltd., had had record years. Cantie Switches, Ltd., had been subject to development difficulties, but as a result of thorough reorganization, it was now on a profit-earning basis. The electrical division continued to work at full pressure, with a large fund of orders on hand, and the results for the first four months of the current year were approximately equal to the corresponding period of 1951-52.

Parmiter, Hope & Sugden, Ltd.—In presenting the report and accounts at the annual meeting held on 3rd September, Mr. E. W. Sugden (chairman) said that in spite of shortages of materials they had increased their turnover. The small decline in profit was not disquieting. The directors had felt that it was in the best interests of the company to keep prices as stable as possible, despite sharp increases in many material costs, and an increase of about 10 per cent in prices was delayed until the turn of the calendar year. It was also felt wise on a number of occasions during the year to make large purchases of raw materials in order to maintain output, without that regard to considerations of price which it was their normal practice to pay. There had been a considerable expansion in their sales activities; a new sales office had been opened in Birmingham to cover the Midland counties, and a new showroom had been established at their Manchester offices.

George Cohen, Sons & Co., Ltd., report a consolidated trading profit for the year ended 31st March last of £2,042,177, as compared with £1,024,090 for 1950-51, which with other income makes a total of £2,051,579. After meeting all charges, including £1,111,500 for taxation, the net profit of the holding company is £704,018 (against £331,983). Of this £329,303 is retained by subsidiary companies, and after adding £65,707 brought in the balance available is £440,422. As already announced, the ordinary dividend for the year is raised from 23 per cent to 26 per cent by a final payment of 18 per cent (against 15 per cent). General reserve receives £250,000 and £73,084 is carried forward.

The report is profusely illustrated, showing the works and some of the products of the group.

In his statement, Mr. C. M. Cohen (chairman and managing director) says that the "nominal" value of the ordinary stock is misleading, and in order to bring the relationship more into line with reality and at the same time strengthen the capital structure, the capitalization of £900,000 of group reserves is recommended, and application for consent will shortly be made to the Capital Issues Committee. The proposal should not be interpreted as foreshadowing a further issue of stock for cash. Moreover, it would not be the intention of the board to recommend any further increase in the dividend purely as a result of this operation.

The Kalgoorlie Electric Power & Lighting Corporation, Ltd., reports a net loss for 1951 of £3,507, as compared with a profit of £6,547 in the previous year. The board states that authority given by the West Australian Electricity Commission to increase power rates only applied with effect from 1st June, 1951, and was not sufficient to fully remedy adverse results of the first five months of the year. Increased rates do apply, however, to all sales during the current year, and the financial results to date reflect this increase.

The Nico Light Engineering Co., Ltd., reports a trading profit for the year to 31st March last of £53,085, as compared with £37,583 for the preceding year, and after meeting all charges, including £19,388 for taxation, there is a net profit of £13,308 (against £9,622). It is proposed to maintain the dividend for the year at 10 per cent, but the bonus is increased from 7½ per cent to 10 per cent. After transferring £8,000 to reserves, a balance of £7,079 is carried forward (against £7,454 brought in).

The Electric Construction Co., Ltd., is making a "rights" issue to ordinary stockholders in the form of an offer of two £1 shares for every seven units held at a price of 42s 9d per share. The issue is expected to raise just over £200,000.

The Palestine Electric Corporation, Ltd., reports a net profit for 1951, after all charges, including I.£100,000 for taxation, of I.£221,809, as compared with I.£208,620 for 1950. The directors do not propose to pay a dividend on the ordinary stock and shares

and " A " ordinary stock, against 5 per cent, tax free, for 1950. This decision has been reached having regard to the steep rise in the operating costs not accompanied by a proportionate increase in electricity tariffs, conditions which have been intensified in the present year, together with the necessity of conserving cash resources for capital expenditure.

The Telegraph Condenser Co., Ltd., is paying an interim dividend of 5 per cent (same) on increased capital.

A. H. Hunt (Capacitors), Ltd., is paying an unchanged interim dividend of 7½ per cent.

Lancashire Dynamo Holdings, Ltd., has declared an interim dividend of 4 per cent (same).

Increases of Capital

British Electrical Repairs, Ltd.—In our issue of 29th August we stated that the capital of this company had been increased by £5,000 in £1 ordinary shares. This was incorrect, the increase being £50,000 in £10 shares.

S. Lightfoot, Ltd.—Increased by £3,015. in £1 shares, beyond the registered capital of £2,000.

J. B. Mackenzie (Edinburgh), Ltd.—Increased by £5,000, in £1 ordinary shares, beyond the registered capital of £5,000.

Burnell's (Leeds), Ltd.—Increased by £4,000, in 2,000 5½ per cent preference and 2,000 ordinary shares of £1 each, beyond the registered capital of £3,000.

Liquidations

Electronics (Clayton), Ltd.—Winding up voluntarily. Liquidator, Mr. E. Hodgkinson, 15, Avenue Parade, Accrington, appointed 25th August. Particulars of claims to the liquidator by 15th September.

Electrical Development Co. (Chester), Ltd.—Winding up voluntarily. Liquidator, Mr. E. S. Browne, 41, North John Street, Liverpool, 2, appointed by the creditors on 22nd August. Particulars of claims to the liquidator by 31st October.

Bankruptcies

L. J. Anthony, carrying on business in co-partnership with another at 6, Dolphin Lane, Boston, Lincs, as Dolphin Electric Co., electrical, radio and television engineer.—Trustee, Mr. C. G. Compton, 2, New Street, Boston, appointed 2nd September.

P. H. Leach, lately carrying on business at 4, Oxford Street, Guiseley, near Leeds, and at 6 and 8, Town Street, Yeadon, Yorks, radio and electrical engineer.—Trustee, Mr. K. Russam, 2a, Tyrrel Street, Bradford, released 22nd August, 1952.

S. I. Rae, carrying on business at 1, Ashburton Road, Gosforth, Northumberland, electrical contractor.—Trustee, Mr. G. Barr, 135, Sandyford Road, Newcastle-upon-Tyne, released 18th July, 1952.

J. H. Bourne, carrying on business under the style of the Amplifier Illumination Co., at Rayleigh Works, Powlett Street, Wolverhampton, electrical fittings and fancy goods manufacturer, and also carrying on business in partnership with another under the style of E. Desborough & Sons, at Rayleigh Works, Powlett Street, Wolverhampton, electroplaters.—Trustee, Mr. A. M. Baker, 12, Waterloo Road, Wolverhampton, released 18th July, 1952.

L. L. O'Connor, described in the Receiving Order as Leo O'Connor (trading as Paragon Electrical), 27, Wellington Square, London, S.W.3, electrical and radio contractor.—Last day for receiving proofs for dividend 22nd September. Trustee, Mr. F. H. Langmaid, Bankruptcy Buildings, Carey Street, London, W.C.2, Official Receiver.

L. R. Maisey, carrying on business at 50, High Street, Alfreton, Derbyshire, and at 3, Main Road, Jacksdale, Notts, electrical contractor.—Last day for receiving proofs for dividend 19th September. Trustee, Mr. F. W. Flint, 5, Regent Street, Nottingham.

J. Bannister, carrying on business as an electrical contractor at 2, The Wiend, Wigan.—Last day for receiving proofs for dividend 20th September. Trustee, Mr. A. T. Eaves, 47, Mosley Street, Manchester, 2.

R. H. Tuck, 7, Grand Parade, Upper Richmond Road, London, S.W.14, electrical engineer, and lately carrying on business with another as London Electrical Contractors, at 109, Great Russell Street, W.C.1, and at 9, Newman Street, W.1, and also lately carrying on business with another as Brotherton & Tuck, at 9, Newman Street, W.1.—Supplemental dividend 3½d in £ (claims postponed under Section 63 (1)), payable on and after 16th September at Bankruptcy Buildings, Carey Street, London, W.C.2.

F. J. Crutchley, carrying on business as " Frank Crutchley " at 9, York Street, Hulme, Manchester, previously carrying on business at 304, Deansgate, Manchester, electrical engineer.—First meeting held 10th September. Public examination 17th October at the Court House, Quay Street, Manchester.

A. Parsons, residing at 23, Clifton Crescent South, Rotherham, and lately carrying on business at 25, High Street, Rotherham, electrician.—Last day for receiving proofs for dividend 17th September. Trustee, Mr. J. B. G. Moore, 55, Queen Street, Sheffield, 1, Official Receiver.

STOCKS and SHARES

A CERTAIN amount of wavering has appeared in both the gilt-edged and industrial markets of the Stock Exchange, but on the whole prices hold fairly tenaciously to the substantial gains established during the previous two months. These advances ranged up to about 6 points in British Government stocks, and to as much as 10s in the case of some industrial shares. Therefore a pause for breath had in any case become due and a more sizable reaction than had taken place would not have occasioned a great deal of surprise. Persistent reluctance of stockholders to be tempted out of their securities by the raising of prices remains an important factor in the market situation and one which tends to magnify the effects of a moderate volume of buying. Very likely it arises from the fact that prices in general are still very much below those which were being paid up to the time, nearly a year ago, when the change of Government brought in the dearer money policy.

Electric Construction

The Electric Construction Company has now issued its 98,485 ordinary shares of £1 each, offered to shareholders at 42s 9d in the proportion of two new shares for seven old. When the shares are fully paid, they will rank *pari passu* in all respects with the existing ordinary shares. They participate in all dividends declared for the year ended 31st March, 1953, and thereafter. The directors say they consider that, in the absence of unforeseen circumstances, the present rate of ordinary dividend can be maintained on the share capital as increased by the present issue. The price of the old shares was marked ex-rights at the beginning of this week, and, at 51s 3d, is $\frac{3}{16}$ higher. The new shares started at a premium of 9s above the issue price of 42s 9d. Maintenance of the 15 per cent dividend would give the new shares at the issue price of 42s 9d a yield of 7 per cent on the money, while at 51s 3d the old shares, on the same basis, would return £5 16s 9d per cent.

" Rights "

Although the issue is the comparatively small one of 98,485 ordinary shares, it is more than likely that a few of the shareholders will fail to take advantage of the very favourable offer now being made to them, and the benefit will accordingly go to the underwriters, who receive a commission of 9d per share and an overriding commission of 3d per share. This commission in itself seems to be generous, and shareholders should on no account miss the opportunity either of selling at a good premium, or of taking up the shares at a tempting price.

Scottish Cables Bonus

Scottish Cables 4s ordinary are now quoted ex the 100 per cent capital bonus, and the price of 11s 9d is about the appropriate half of the previous figure. In this connection, it is worth noting that on these free bonus occasions the market nearly always reports a good deal of selling of new shares, and that not everybody appears to realize the absence of any profit in so doing. Earlier this year, the company raised the distribution on the former capital from 30 to 32 per cent, and for practical purposes the shares are now assessed on a 16 per cent dividend basis, so that the prospective yield on the shares is a little under 5¾ per cent. The latest payment was well covered by the year's earnings The bonus shares rank equally with the old for future dividends and in all other respects.

Preference Shares

Prices of industrial preference shares have been closely following the upward course of gilt-edged securities. The former continue to appeal to the fairly wide range of investors who want something better than the return on Government stocks, without the element of risk inseparable from even the best of ordinary shares. On the most favoured electrical preference shares, the present buyer can obtain between 5 and 5½ per cent on his money, as compared with the present yield of 4½ per cent from War Loan, or around 3½ per cent from medium-dated gilt-edged issues such as the 3 per cent British Electricity stocks. As always, prices of the shares reflect discrimination on the part of the investor in favour of the issues quoted around their par value. However nebulous the risk may be, the high-interest-bearing preference stocks standing at anything like a substantial premium are regarded as being in a potentially vulnerable position.

Shares on Offer

Preference shares on offer in the industrial markets to give the buyer a return of about 5 per cent include A.E.I. 4½ per cent preference at 18s, G.E.C. 4½ per cents at 17s and B.I.C.C. 6 per cents at 24s. Crompton Parkinson 6 per cent second preference at 23s 6d and Tube Investments 4½ per cents (redeemable) at 17s 7½d give a florin per cent more, while returns of 5¼ to 5½ per cent can be obtained from Crabtree Electric " fives " at 19s, Hoover 5½ per cents at 21s and Laurence, Scott 4¼ per cents at 15s 6d. About the 5¾ per cent yield mark are the 5½ per cent preference shares of E. K. Cole at 19s and also Plessey 4½ per cents at 15s 7½d. Among the higher-yielders are Cossor 6 per cents, giving a little over 7 per cent at 17s.

Electrical Investments

Past Week's Price Changes

Company	Dividend Previous	Dividend Last	Middle Price 8th Sept. 1952	Week's Rise or Fall	Est. Yield p.c.
Gilt-edged and Overseas Stocks			£ s d		
Brit. Elec. 1968/73	3	3	84½	—	3 11 0
Brit. Elec. 1974/77	3	3	83½	—	3 11 10
Brit. Elec. 1976/79	3½	3½	90½	—	3 17 4
Brit. Elec. 1974/79	—	4½	99½	—	4 5 5
Calcutta Elec. ..	6†	6†	20/6	—	5 17 1†
East African Power	7	7	26/-	−6d	5 7 8
Nigerian Elec. ..	10	10	21/3	—	—
Palestine Elec."A"	5†	Nil	11/6	−2/6	Nil
Perak Hydro-Elec.	Nil	Nil	13/9	—	Nil
Equipment and Manufacturing					
Aberdare Cables (5/-)	20	20	13/9	—	7 5 6
Aerialite (1/-) ..	83½	88½	8/-	+6d	11 0 9
Aron Elec. Ord. ..	15	15	33/9	—	8 17 9
Assoc. Elec. Ord. ..	20	20	71/6	—	5 12 0
Automatic Tel. & El.	15	15	58/3	+3/3	5 3 5
Babcock & Wilcox	18	18	71/3	−6d	5 1 1
Baldwin, H. J. (2/-)	25	25	4/9	—	10 10 6
Bakelite (10/-) ..	—	—	17/6	—	—
British Aluminium	10	12	44/6	+3d	5 7 10
B.I. Callender's ..	7½	9	32/6	—	5 10 9
British Thermostat (5/-) ..	30	30	24/6	—	6 2 5
British Vac. Cleaner (5/-) ..	25	25	13/-	—	9 12 4
Brook Motors (10/-)	20	20	28/9	—	6 19 2
Brush Ord. (5/-) ..	10	10	6/-	—	8 6 8
A. F. Bulgin (1/-)..	27½	30	2/6	—	12 0 0
Burco (5/-) ..	42½	38¾	19/6	—	9 18 6
Chloride El. Storage	15	15	60/-	+1/6	5 0 0
Cole, E. K. (5/-) ..	25	25°	16/6	—	7 11 6
Cossor, A. C. (5/-)	Nil	10	9/-xd	—	5 11 1
Crabtree (10/-) ..	17½	17½	35/9	—	4 18 0
Crompton Parkinson Ord. (5/-) ..	11¼	11¼	9/3	—	6 2 0
De La Rue (5/-) ..	50	35°	10/9	−1/6	—
Decca (1/-) ..	112½	112½	18/6	+3d	6 2 0
Dewhurst (2/-) ..	35	22½°	4/3	—	—
Dictograph Tel.(2/-)	20	20	4/6	—	8 17 9
E.M.I. (10/-) ..	8	12	15/9	−3d	7 12 3
Electrical Components (5/-) ..	20	20	10/-	—	10 0 0
Elec. Construction	15	15	51/3xr	+2/6	5 16 9
Enfield Cable Ord.	7½	7½	22/-	+1/-	6 16 4
English Electric ..	15	15	58/-	—	5 3 6
Ericsson Tel. (5/-)	22†	22°†	41/-	—	2 13 8†
Ever Ready (5/-)	35	35	26/-	+3d	6 14 7
Falk Stadelmann	15	15	37/-	—	8 2 2
G.E.C. Ord. ..	17½	22½	85/-xd	—	5 5 10
General Cables (5/-)	30	30	12/6	—	12 0 0
Greenwood & Batley	15	15	37/-	—	8 2 2
Hackbridge Cable (5/-)	20	20	11/3xd	—	8 17 10
Hackbridge Hewittic (5/-)	18	20	16/3	—	6 3 0
Hall Tel. Acc.(10/-)	10	10	9/9	—	10 5 2
Heatrae (2/-) ..	12½	12½	4/-	—	6 5 0
Henleys (5/-) ..	20	20	18/3	+6d	5 10 4
Holophane (5/-) ..	15	15	10/9	—	—
Hoover (5/-) ..	37½	35°	26/-	—	6 14 7

Company	Dividend Previous	Dividend Last	Middle Price 3th Sept. 1952	Week's Rise or Fall	Est. Yield p.c.
Equipment and Manufacturing (continued)			£ s d		
Intl. Combustion (5/-)	20	25	24/3	−6d	5 3 1
Johnson & Phillips	15	15	53/9	+1/8	5 11 1
Lancashire Dynamo	22½	12½°	43/9	—	5 14 2
Laurence, Scott (5/-)	12½	15	11/9	—	6 7 8
London Elec. Wire	10	12½	48/3	—	5 3 9
J. Lucas	17½	7½°	35/-	—	4 5 9
Marryat & S. (2/-)	22½	22½	5/-	—	9 0 0
Mather & Platt ..	12½	12½	42/6	—	5 17 8
Metal Industries ..	10	15	39/6	—	—
Mid. Elec. Mfg. ..	15	15	56/3	—	5 6 8
Murex	12½	15	57/-	—	5 5 3
Newman Ind. (2/-)	6	10	2/3	—	8 17 10
Oldham & Son (1/-)	30	35	2/9	—	—
Parnall (Yate) (5/-)	6	6	3/9	+6d	8 0 0
Parsons, C. A. ..	15	10°	52/6	+1/8	3 16 2
Plessey (5/-) ..	20	22½	18/-	—	6 5 0
Pye Deferred (5/-)	18	18	15/6xd	—	5 16 2
Revo (10/-) ..	27½	27½	39/3	—	7 0 1
Reyrolle	15	10°	50/9	+9d	3 18 9
Scot. Cable (4/-) ..	30	32	11/9	—	—
Siemens Ord. ..	10	10	34/3	—	5 16 9
Strand Elec. (5/-)..	17½	17½	8/9	—	10 0 0
Sturtevant (5/-) ..	16¾†	17¼°†	23/6	—	—
Switchgear & Cowans (5/-)	22½	22½	13/9	—	8 3 8
Taylor T. (5/-) ..	20	20	20/-	—	5 0 0
T.C.C. (10/-) ..	20	20°	36/3	—	—
T.C. & M.	10	10	24/6	—	—
Telephone Mfg. (5/-)	10	10	8/6	+3d	5 17 8
Thorn Elec. (5/-) ..	10	12½	8/6	—	7 7 0
Tube Investments	25	25	58/-	−9d	—
Vactric (5/-) ..	Nil	Nil	4/6	—	Nil
Veritys (5/-) ..	Nil	7½	4/9	—	7 18 0
Walsall Conduits (4/-)	70	70	45/-	—	—
Ward & Goldstone (5/-)	45	45°	29/-	—	—
Watford (2/-) ..	25	25	6/-	—	8 6 8
Westinghouse Brake	14	14	50/6	+6d	5 11 0
West, Allen (5/-) ..	12½	15	10/3	—	7 6 4
Trusts, Transport and Communications					
Anglo-Am. Tel.: A Ord.	4½	4½	90	—	5 0 0
Ord.	56/3	57/6	55	+3d	5 4 7
Anglo-Portuguese	8	8	21/6	+3d	7 8 10
Brit. Elec. Traction: Def. Ord. ..	22½	25	425	—	5 17 8
Cable & Wireless: Ord.	6	8	124½	—	6 8 6
4% Loan ..	4	4	95½	—	4 3 9
Calcutta Trams ..	6†	6†	23/-	−6d	5 4 4†
Cape Elec. Trams	4	5	12/6	—	8 0 0
Marconi Marine ..	7½	10	31/3	+1/6	6 8 0
Oriental Tel. Ord.	16	16	35/9	+9d	—
Telephone Props...	8	8	31/3	—	5 2 5
Tele. Rentals (5/-)	10	10	8/3	+3d	6 1 3

° After capital bonus.
† Dividends are paid free of Income Tax.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s 8d each including postage) will be obtainable after 22nd October from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1946

31493. Philips Lamps, Ltd.—Luminescent materials. 23rd October, 1946. (681141.)

1947

7135. Philips Lamps, Ltd.—Luminescent screens. 14th March, 1947. (681142.)

1948

1863. Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz.—Discharge tubes for transmitting television images. 21st January, 1948. (681143.)

5987. Director of Office of Technical Services, Department of Commerce.—Magnetrons. 27th February, 1948. (681422.) 5991. Thermionic vacuum tubes. 27th February, 1948. (681423.)

6119. British Thomson-Houston Co., Ltd.—Electrically-heated pressure cookers. 27th February, 1948. (681424.)

8663. Compagnie Générale de Télégraphie sans Fil.—Tubes of the magnetron type for ultra-short waves. 24th March, 1948. (681425.)

15874. Marconi's Wireless Telegraph Co., Ltd.—Cathode-ray tube apparatus. 12th June, 1948. (681245.)

19758. British Thomson-Houston Co., Ltd., and Jones, K. M.—Mechanical drives for carbons in arc lamps. 11th July, 1949. (681145.)

25612. Vackar, J., and Klika, V.—Apparatus for reducing the distortion of an electronic amplifier. 1st October, 1948. (681344.)

28310. Mole-Richardson (England), Ltd., and Hallett, C. G. H.—Electric arc lamps. 18th October, 1949. (681426.)

1949

2202. Gretener, E.—Arc lamps. 26th January, 1949. (681349.)

4839. General Electric Co., Ltd., and Gilchrist, D. C.—Means for suppressing ripple on electric supply systems. 16th February, 1950. (681148.)

6740. Philips Electrical, Ltd.—Gas- and/or vapour-discharge lamps. 11th March, 1949. (681355.)

7457. Plessey Co., Ltd.—Electromagnetic lenses. 16th March, 1950. (681150.)

7846. Jefferies, F. G.—Electrically operated steam generating apparatus and the like. 23rd March, 1950. (681356.)

9254. British Thomson-Houston Co., Ltd., Griffiths, L., and Farlow, G. E.—Electric lighting systems for vehicles. 8th March, 1950. (681153.)

[illegible]742. Maschinenfabrik Oerlikon.—Combined steam-turbine and gas-turbine plant. 12th May, 1949. (681254.)

13151. Marconi Instruments, Ltd.—Frequency deviation standards. 7th February, 1950. (681255.)

15022. Metropolitan-Vickers Electrical Co., Ltd.—Electric step-by-step control or indicating systems. 16th May, 1950. (681161.)

16420. English Electric Co., Ltd.—Control systems for dynamo-electric machines. 13th September, 1950. (681162.)

16596. Philips Electrical, Ltd.—Tone control circuits for low-frequency amplifiers. 22nd June, 1949. Addition to 640184. (681359.)

16732. British Telecommunications Research, Ltd.—Circuit arrangement for storing and retransmitting impulses. 25th May, 1950. (681360.)

16965. Gretener, E.—System for regulating the positive electrode of an arc lamp. 27th June, 1949. (681164.)

24780. Electric & Musical Industries, Ltd.—Mounting of cathode-ray tubes. 21st September, 1950. (681371.)

25225. General Electric Co., Ltd., Douglas, R. W., and Isard, J. O.—Manufacture of electric-discharge devices. 29th September, 1950. (Cognate application 30472, 28th November, 1949.) (681180.)

25600. Philips Electrical, Ltd.—Superheterodyne receivers. 5th October, 1949. (681265.)

26432. English Electric Co., Ltd.—Electric remote control or indicating systems. 16th October, 1950. (681375.)

27021. Rolls-Royce, Ltd.—Compressor systems having electrically-heated blades and blading elements therefor. 20th October, 1950. (681186.)

27068. Philips Electrical, Ltd.—Devices for producing electro-magnetic waves of a wavelength of the order of not more than one centimetre. 21st October, 1949. (681268.)

28750. Metropolitan-Vickers Electrical Co., Ltd.—Railway vehicles. 12th October, 1950. (681187.)

30471. General Electric Co., Ltd., and Bloch, A.—Photo-electric devices. 28th November, 1950. (681272.)

31158. Franco-British Electrical Co., Ltd., and Brackensey, A. H.—Control systems for varying the luminous output of electric-discharge tubes. 24th November, 1950. (Cognate application 2756, 2nd February, 1950.) (681191.)

31992. Metropolitan-Vickers Electrical Co., Ltd.—Construction and operation of betatrons. 3rd October, 1950. (681380.)

33420. Siemens Bros. & Co., Ltd., and Double, H. S.—Voltage-regulating arrangements employing saturable regulating chokes. 21st December, 1950. (681277.)

1950

2843. English Electric Co., Ltd.—Dynamo-electric amplifying apparatus, and automatic control systems employing such apparatus. 2nd February, 1951. (681283.)

3812. Automatic Telephone & Electric Co., Ltd.—Mounting arrangements for spark quench devices. 23rd January, 1951. (681208.)

4071. Cole, Ltd., E. K., and Burnard, C. L.—Tuning arrangements for radio receivers. 15th February, 1951. (681178.)

5196. British Thomson-Houston Co., Ltd., and Griffiths, L.—A.c./d.c. ignition and lighting systems, particularly for vehicles. 26th February, 1951. (681292.)

6040. General Motors Corporation.—Electromagnetic-acoustic signal devices. 10th March, 1950. (681480.)

6344. Imperial Chemical Industries, Ltd.—Electric detonators and electric blasting assemblies. 14th March, 1951. (681481.)

7000. Pye, Ltd.—Noise limiting circuit, particularly for television receivers. 19th March, 1951. (681294.)

7504. Sylvania Electric Products, Inc.—Apparatus for operating electric-discharge lamps in series. 24th March, 1950. (Addition to 633448.) (681452.)

7987. Willheim, R.—Device for producing an electric reference magnitude. 30th March, 1951. (681213.)

8515. Cole, Ltd., E. K., and Finch, H. W. S.—Apparatus for measuring small currents or voltages. 5th April, 1951. (681214.)

10106. Allen, L.—Electric torches and like portable lamps. 2nd February, 1951. (681221.)

10169. British Thomson-Houston Co., Ltd.—Permanent magnets. 25th April, 1950. (681300.)

10802. General Electric Co., Ltd., and Amies, D.—Magnetic sweeping devices. 2nd May, 1951. (681223.)

11084. Minister of Fuel and Power. Battery equipment for miners' electric lamps. 2nd May, 1951. (681303.)

12789. Metropolitan-Vickers Electrical Co., Ltd.—Dynamo-electric machines. 5th April, 1951. (681403.)

14652. National Research Development Corporation.—Electrical impulse motors. 11th June, 1951. (681400.)

14872. British Thomson-Houston Co., Ltd.—Methods of making electron-emitting coatings. 14th June, 1950. (681230.)

16544. Canadian Controllers, Ltd., and Grepe, F. Y.—Automatic dynamic braking compensation system for a.c. electric motors. 3rd July, 1950. (681316.)

21376. Sutton Corporation, Inc., O. A.—Electric fan. 29th August, 1950. (681409.)

22871. Hazeltine Corporation.—Electrical computer. 18th September, 1950. (Addition to 663225.) (681500.)

25608. Western Electric Co., Inc.—Electronic switching networks. 20th October, 1950. (681330.)

25335. Radio Corporation of America.—Combination automatic gain control and amplitude discriminator circuits for radio reception. 20th October, 1950. (681331.)

26399. British Thomson-Houston Co., Ltd., and Thomas, D. C.—Co-ordinate converters. 30th October, 1950. (681511.)

29895. Automatic Electric Laboratories, Inc.—Automatic exchange switches. 6th December, 1950. (681462.)

30228. Hagebeuker, K.—Electrical hair-cutting machines. 11th December, 1950. (681333.)

31020. Western Electric Co., Inc.—Method of producing magnetic materials. 20th December, 1950. (681466.)

31582. Standard Telephones & Cables, Ltd.—High-energy radiation counter. 29th December, 1950. (681468.)

31683. Coop, N. B.—Electric clocks. 15th August, 1951. (681521.)

1951

2413. Forges et Ateliers de Constructions Electriques de Jeumont.—Alternating current track circuit signalling systems for electric railways. 31st January, 1951. (681532.)

7209. British Thomson-Houston Co., Ltd.—Dynamo-electric machines. 28th March, 1951. (681419.)

CEYLON'S ELECTRICAL IMPORTS

THE electrical import trade of Ceylon showed healthy expansion last year with Great Britain holding a good share in most lines in the face of increasing competition. The total value was Rs. 32,518,000, a rise of 60 per cent on 1950. (Rupee = approx. 1s 6d.) There were noteworthy increases in wires and cables, radio apparatus, batteries and unspecified electrical machinery. Holland was notably active, with Australia and India also contributing.

Japan's return to the market was evident, and has been more apparent during the current year, when so far her imports as a whole have risen by 50 per cent. Under an arrangement just concluded Japan will provide technical assistance in connection with Ceylon's industrial development. Meanwhile constructional work generally has been hampered by shortage of steel. Canada has agreed to render assistance in connection with rural electrification in the Gal Oya valley.

Recently the Board of Trade has received information from Colombo that radio goods, refrigerators and refrigeration machinery from "dollar" countries are now subject to import restrictions.

Class of Equipment	1951 Rs. (100)	Inc. or dec. on 1950 Rs. (000)
Control and switchgear	1,093*	— 496
Transformers and convertors	451*	+ 202
Generators, alternators and exciters	826	+ 278
From United Kingdom	793	+ 307
„ *United States*	27	— 35
Motors	469	— 129
From United Kingdom	438	— 102
„ *United States*	18	— 22
Electrical machinery n.e.s.	1,880	+ 616
From United Kingdom	1,128	+ 110
„ *United States*	115	+ 79
„ *Australia*	356	+ 352
„ *India*	182	+ 74
Rubber insulated wires and cables	2,719*	+ 1,722
Other electric wires and cables	2,564*	+ 563
Radio instruments and apparatus	4,744	+ 3,109
From United Kingdom	4,007	+ 2,407
„ *United States*	98	— 3
„ *Holland*	419	+ 13
Other telegraph and telephone instruments	1,603*	+ 416
Lamp bulbs, gasfilled	532	+ 124
From United Kingdom	445	+ 66
„ *Holland*	26	+ 8
„ *Japan*	51	+ 39

Class of Equipment	1951 Rs. (000)	Inc. or dec. on 1950 Rs. (000)
Other lamp bulbs	322	+ 134
From United Kingdom	164	+ 13
„ *Japan*	18	— 72
„ *Holland*	135	+ 134
Torch bulbs	456	— 53
From United Kingdom	79	— 127
„ *Holland*	114	— 16
„ *Hong Kong*	90	— 59
„ *United States*	152	+ 128
Lighting accessories and fittings	2,635	+ 72
From United Kingdom	1,373	+ 271
„ *United States*	193	+ 155
„ *Hong Kong*	666	— 649
„ *Japan*	62	+ 51
„ *Holland*	196	+ 166
Batteries, dry, radio	113*	+ 88
Ditto, other than radio	8,515	+ 5,149
From United Kingdom	5,062	+ 4,798
„ *Malaya*	1,094	— 1,332
„ *Australia*	886	+ 432
Other batteries and accumulators	44*	— 93
Electrical goods n.e.s.	3,553	+ 819
From United Kingdom	2,697	+ 519
„ *United States*	469	+ 263
„ *Japan*	33	+ 31
„ *Germany*	72	— 371

* Mainly from United Kingdom.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia. — MELBOURNE. — 23rd October. Director, Posts and Telegraphs. Supply of 2,000 switch maintenance parts. (C.R.E. 30038/52. Ten/4588.)*

Castle Ward (Northumberland).—26th September. Rural District Council. Electrical installations in 100 houses at Ponteland. G. E. Dimmack, surveyor, North Road, Ponteland.

Hexham.—22nd September. Rural District Council. Duplicate electric motor and self priming centrifugal pump. G. Nicholson, clerk, Prospect House.

Manchester.—3rd October. City Education Committee. Electrical engineering equipment for the Municipal College of Technology. (See this issue.)

Newcastle-on-Tyne. — 24th September. City Council. Electrical installations in 120 flats and maisonnettes under construction at Hindhaugh Street, Newcastle. City architect, 18, Cloth Market.

Peru.—LIMA.—25th September. Direccion de Industrias y Electricidad. Machinery and auxiliary equipment for Cajamarca hydro-electric station. (C.R.E. 29965/52. Ten/4574.)*

25th September. Electrical control equipment for State power stations. (C.R.E. 29961/52. Ten/4583.)*

Portuguese West Africa.—ANGOLA.—8th October. Department of Posts, Telegraphs and Telephones. Telephone cable, wire and accessories. (C.R.E. 27779/52. Ten/4607.)*

South Africa. — JOHANNESBURG. — 2nd October. South African Railways. Train lighting dynamos and auxiliaries. (C.R.E. 30472/52. Ten/4621.)*

Syria.—DAMASCUS.—1st October. Directorate General, Syrian Broadcasting Service. V.h.f. broadcast links between Damascus and Sabbourah, and a mobile outside broadcast van. (C.R.E. 29985/52. Ten/4585.)*

2nd October. Damascus Electricity Administration. Substation equipment and h.v. line. (C.R.E. 28863/52. Ten/4572.)*

Uruguay. — MONTEVIDEO. — 15th October. Usinas Electricas y Telefonos del Estado. Lead covered conductors. (C.R.E. 30222/52. Ten/4591.)*

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Horse Guards Avenue, Whitehall, S.W.1 (Trafalgar 8855).

ORDERS PLACED

Banbury.—Corporation. Recommended. Installation of electric immersion heaters in 244 houses (£2,278).—C. A. Hale.

Bromley.—Education Committee. Recommended. Electrical installation work at Pickhurst County Primary School (£1,013).—Reid & Barrow.

Durham.—County Council Education Committee. Electrical installation at Billingham College of Further Education (£19,112).—Troughton & Young, Ltd.

Electrical installation work at Throston County School, Hartlepool (£1,081).—North of England Engineering & Electrical Co., Ltd.

Mansfield.—Corporation. Supply and erection of Group "A" street lamps in Woodhouse Road and Leeming Street, Chesterfield Road North and South, West Gate, Church Street, Toothill Lane and Queen Street (£4,283).—G.E.C.

Morpeth (Northumberland).—Town Council. Electrical installations in 422 houses at present served only by gas.—Mood & Sons.

Newbiggin (Northumberland).—Urban District Council. Electrical work at 50 new houses on the Spital estate.—J. B. Wilson.

Seaham (Durham).—Urban District Council. Supply of electrical materials for the maintenance of Council houses.—Electrical and General Stores.

Sheffield. — Housing Committee. Recommended. Electrical installations in 414 dwellings, Hackenthorpe estate (£5,645).—M. J. Gleeson (Contractors), Ltd.

Education Committee. Recommended. Electrical installation work, Brook Secondary School (£11,238).—T. W. Sampson & Co., Ltd. Accepted. Electrical installation work, Greenhill Secondary School (£7,673) and Stradbroke County School (£5,775).—Yorkshire Electricity Board.

Stoke-on-Trent. — Corporation. Recommended. Electrical installations in 90 houses on the Blurton (No. 2) site and 16 houses on the Hillside estate, Meir (£3,762); 34 houses on the Blurton estate (£1,166); and 68 houses, Newstead Farm estate (£2,342).—Newcastle Electrical Co.

Installations in 20 houses on the Blurton (No. 2) site (£682).—R. Hulme, Longton.

Installations in 36 houses (£1,131) and 96 houses (£3,101) at Uperley Farm, Pucknall estate.—Midlands Electricity Board.

Wednesbury.—Corporation. Recommended. Electrical installations in 126 houses on the Dangerfield Lane (Lodge Holes) site (£2,472).—H. Harvey, Tipton.

West Hartlepool.—Education Committee. Installation of electricity at Newburn County Primary School.—Edgar Phillips, Ltd.

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdare.—Pithead baths and medical centre, Fforchaman Colliery; National Coal Board, Cambrian Buildings, Mount Stuart Square, Cardiff.

Aberdeen.—School, Aboyne, for C.C.; Geo. Bennett Mitchell & Son, 1, West Craibstone Street, Aberdeen.

Nursery-infants' school, Cummings Park, for T.C.; J. A. O. Allan, Ross & Allan, 10, Bon-Accord Square, Aberdeen.

Adwick.—Houses (220); Council's architect, Adwick, Doncaster.

Ashton-in-Makerfield.—Swimming baths on site near Market Ground (£55,000); surveyor, Urban Council Offices.

Aylesbury.—Houses (75) on Honeydene Estate, Wendover; R.D.C. surveyor, Buckingham Street.

Barnsley.—Extensions at Hoyle Mill, Stairfoot Lane, Barnsley, for T.C.; James Totty & Co., architects, Imperial Buildings, Rotherham.

Barnstaple. — Development of estate for housing, West Sowden; borough surveyor, The Castle.

Belper (Derbyshire).—Houses (60), Woodlands Road, Allestree; R.D.C. surveyor.

Bishop Auckland.—Houses (80) and 14 old people's bungalows on Woodhouse Close estate; U.D.C. surveyor.

Bolton.—Works extensions; Bolton Hide, Skin & Fat Co., Velvet Works.

Boston.—Pumping stations and treatment works, Fishtoft, Wyberton and Frampton, for R.D.C.; Binnie, Deacon & Gourley, engineers, Artillery Row, Westminster, S.W.1.

Bromley.—Houses (74) on the Blackbrook estate; borough engineer, Municipal Offices.

Carmarthenshire. — Technical colleges at Ammanford (£172,972) and Pinwrewyd, Carmarthen; W. T. Lloyd, county architect, County Hall, Carmarthen.

Chelmsford.—Factory extensions; Windley Bros., engineers, Crown Works, London Road.

Croydon. — Fairfield Technical College (£256,986); E. Taberner, town clerk.

Grammar school, Upper Shirley Road; Mauger & Partners, architects, Parkway Chambers, Welwyn Garden City.

Dukinfield.—Houses (34), Yew Tree Lane No. 2 site; Cruikshank & Seward, architects, 16, Princess Street, Manchester.

Durham.—Fire station at Peterlee for the C.C.; county architect, Court Lane, Durham.

East Barnet.—Houses (148) on three sites; C. M. Barnes, U.D.C. surveyor, Station Road, New Barnet.

Eccles.—Works extensions for Lankro Chemicals, Ltd.; Snape & Sons, Ltd., builders, Clifton Road.

Eston (Yorks).—Additions to hospital in Flatts Lane, Normanby, for Newcastle Regional Hospital Board, "Dunira," Osborne Road, Newcastle-on-Tyne.

Exeter.—Shops and flats (£130,000), High Street; A. F. French & Partners, architects, 23, Westwell Street, Plymouth.

Gateshead.—Houses (269), Wrekenton and the Cedars; J. Clark & Son, builders, Gregson Terrace, New Seaham.

Glasgow.—Extensions at Viner Street for Hugh Baird & Sons, Ltd., 45, Renfield Street; Crouch & Hogg, Woodside Crescent, Glasgow, C.3.

Goole (Yorks).—Houses (83), Snaith, Rawcliffe, Swinefleet, Pollington, etc.; R.D.C. architect.

Huyton-with-Roby. — Houses (360), St. John's Road East site; K. Pilkington, U.D.C. surveyor, Derby Road.

Isle of Wight.—Houses (80) on four sites; E. L. Smith & Son, architects to R.D.C., High Street, Sandown, I.W.

Keighley. — Technical college, Cavendish Street; West Riding county architect, Wakefield.

Liverpool.—Physiotherapy department and reinstatement of maternity block at Walton Hospital for Regional Hospital Board; Ormrod & Banister, architects, 49, Rodney Street.

Large shops and offices at Church Street for Littlewoods, Ltd.; A. E. Sherman, architect, John Street.

London.—BLACKHEATH.—Flats (294), Shooters Hill Road; Armstrong & MacManus, architects, 10, Lower Grosvenor Place, S.W.1.

PUTNEY.—Reinstatement of nurses' home at Putney Hospital; Adams, Holden & Pearson, architects to Hospital Board, 2, Gordon Square, London, W.C.1.

ST. PANCRAS.—Aged persons' hostel, Osney Crescent; borough engineer.

Loughborough.—Hostel block at Loughborough College (£26,000); Leicestershire county architect, 123, London Road, Leicester.

Luton.—Fire station, New Bedford Road and Studley Road; county architect, Shire Hall, Bedford.

Nantwich. — Houses (52), Baddington, Buerton, Shavington and Wrenbury; R.D.C. surveyor, Pillory Street.

Northumberland.—Additions to Newburn Hall School (£4,800), Newbiggin County Modern School (£4,800), and hostel accommodation for Hexham County Grammar School (£10,000); county architect, County Hall, Newcastle-on-Tyne.

North Walsham.—Houses (40), Cromer Road; C. H. Dann, architect, 37, St. Giles Street, Norwich.

Nottingham.—Conversion of premises at Chesterfield Street into people's college (£15,000); borough engineer.

Poole.—Houses (76), Waterloo estate; borough engineer.

Witham.—Houses (72), Rivenhall Oak; A. E. Wiseman, architect, 10, Duke Street, Chelmsford.

Wokingham.—Houses (24), St. Sebastian's, Nine Mile Ride; E. G. V. Hives, architect to R.D.C., 3, Cork Street, Reading.